The Iron Age

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The Manipulation of Heavy Forgings.*

BY T. PUTNAM.

In dealing with the subject of heavy forgings I propose to confine the limits of this paper to such as are used in the construction of a steamship—viz., the stern frame and rudder. It is hardly necessary to remark that such important factors to the safety of a vessel as the stern frame and rudder should be reliable as to strength and soundness. This reliability is dependent upon the methods adopted in their construction. I regret to say that until lately too little attention has been paid to this subject by those chiefly interested; the consequence has been serious losses in the shipping world through the giving way of imperfectly made stern frames and rudders. I am informed by Lloyd's that during the last three years, on the East Coast alone, something like 50 broken frames have come under their notice, and in one week recently no less than seven steamers put into port with defective stern frames. These facts deserve serious thought. A steamer at sea with a broken shaft may weather through, but with her steering-power gone she is a very helpless affair.

The cause of these failures, and how to prevent such occurring, I will endeavor to show.

First, I will deal briefly with the general practice in the manufacture of the forgings of a stern frame, which is made up by three separate pieces—the forward piece A, the after piece B, and the keel-piece C, Fig. 14. The forgeman commences the forward piece by making a butt, A, on the porter or carrying-bar B. Fig. 7; on the top of this butt a number of slabs are laid, with small blocks of iron between each slab to insure thorough heating. After being heated they are hammered down and a similar arrangement of slabs laid up on the opposite side of the butt. This is repeated alternately until a square mass of solid iron is laid up sufficient to form the boss, which is then rounded under the hammer. A steel punch is now driven through the center of the mass, and the arch or upper portion of the forward piece, drawn out, as shown in Fig. 7. In the case of large frames having double posts the upper part is forged as shown in Fig. 15, the arch being afterward bent to the required radius by the smith. This enables the largest frame to be made in three pieces, instead of four, and sometimes five, the usual practice. After finishing the upper end the carrying-bar is cut off, the piece turned and the lower part drawn out. In forging the after piece iron is laid up in sufficient quantity to enable the forgeman to cut out the wing of the arch A, Fig. 16, the post is drawn away, the gudgeons C being forged on at the same time solid. The keel-piece, Fig. 8, is forged in a somewhat similar manner, the wings of the after and forward pieces being cut out of a solid mass, as shown by the dotted lines in Fig. 8. After drawing the keel out the porter is cut off, the forging turned and the heel or lowest gudgeon shaped. You will notice that butts are left on each end and wing of the three forgings.

From the hammer the forgings are generally passed direct to the smith, to be dressed to the required sizes. In well-regulated forges, however, this practice has been abolished, the forgings being machined instead. By machining them, accuracy in working to the dimensions, which cannot be achieved by hand labor, is obtained. In addition, the repeated heating tending to render the iron granular in structure, and cold-hammering by the smith, necessary to produce an even surface, but which is apt to make the iron brittle, are avoid. The forgings are now ready to be welded together, but before describing the processes by which this is effected it will be advisable to consider what is to be attempted, and the difficulties that have to be encountered. Wrought iron has a characteristic property of assuming a soft, pliable condition through a long range of temperature below 2000° C., its melting point, which enables two separate pieces to be united together or welded. At a bright white heat this process can be so successfully accomplished that it is impossible to discover where the union has been effected, provided that, if there is not a sufficient amount of silicon combined with the iron to form a fusible cinder, a proper flux is used. The reason of this will be to many present obvious. In heating iron a certain amount of scale is formed through oxidation of the furnaces in contact with the atmosphere. This scale, when consisting of pure oxide of iron, is infusible at a temperature higher than the welding point, but if alloyed with silicon it is converted into an exceedingly fluid and fusible silicate of protoxide of iron, which under proper pressure, correctly applied, is readily expelled; the clean surfaces of iron are brought into contact and molecular cohesion takes place. Now, paying due consideration to this, to carry out the welding of two large sections of iron successfully the three chief points to aim at are: 1. To obtain a temperature on the surfaces to be welded that is effective. 2. The arrangement of the two pieces in a manner that will enable the cinder to escape. 3. That the power applied to expel the cinder is sufficient. To the heating too much attention cannot be paid. If the temperature be too low, the intervening cinder being in a viscous condition, its entire extrusion cannot be effected, and the outer edges of the bars are the only portions welded, the center of the bar being quite unsound. Specimen C, Fig. 5, shows this distinctly. On the other hand if the temperature is too high, and through this the bar is, to use a technical term, burnt, the iron becomes unworkable and cannot be welded.

I can now deal with the final and most critical part of the whole process, viz., the finishing of the frame by the smith putting the forgings together. In the practice most prevalent—that is, hand-welding by means of screws—the smith commences by cutting short scarfs, as shown in Fig. 9, allowing very little excess for waste during heating, and, acting upon the assumption that what was good enough for welding engine tires would be good enough for a stern frame, he effects a weld by continually tightening the screws, thus drawing the two pieces together while in the fire. Fig. 10 shows the arrangement of the screws and tie-rods for effecting the weld in the arch, and Fig. 11 the arrangement of the same for welding the keel-piece on to the forward and after pieces. Three-quarters of an inch is usually allowed for screwing; as soon as the pieces have been drawn up this amount it is assumed that the weld is perfect. The frame is brought from the fire to the anvil, and a few blows are struck on the side of the scarf with a three-handed "Johnny" hammer, shown in Fig. 12. The unreliability of this process is apparent and is now perfectly well known; yet, chiefly for the reasons stated at the commencement of this paper, it still continues in force in a very great number of forges. In the first place, on account of the small amount of material left on the parts to be welded over the finished size of the frame, if the heating is continued for the requisite time—that is, until the scarfs or interior of the bar are at a welding temperature—the outer edges of the bar have wasted so much in the fire that it is below the required size; therefore neither the shipbuilder nor Lloyd's would pass it. Consequently, to insure a full-sized section in the finished frame in order to pass survey, it frequently happens that the heating is not prolonged sufficiently to allow a welding heat to be obtained in the center. Again, the scarfs or butts being so short, or, rather, the angle on the inside of the scarf points being so great, any force applied on the side of the frame only tends to open the weld instead of further cementing it. Thirdly, from the time the two parts to be welded begin to heat until the frame is brought to the anvil the screws are kept going by the smith, thus tightening up the faces of the scarfs.

Now this screwing, I am told at the different works where it is in vogue, really affects the weld. Hand-hammering is merely a secondary consideration. So far as the hammering is concerned this is correct; but for large sections hand-screwing is not only useless, but absolutely dangerous to the success of the weld, for the simple reason that the cinder originally on the face of the scarfs after cutting, and that formed during the heating, remained there when the frame is supposed to be finished. The scarf faces are close together at the commencement of the heat; by being screwed up they are kept in close contact during the heat, and, however fluid the cinder may be, there is no means or way by which it can escape; there it remains, an impenetrable and effectual barrier to metallic contact. To these grounds, more particularly the latter, stern-frame failures may be attributed, and, knowing how repeated and numerous were the failures of engine tires welded by screw pressure, can it be a matter of surprise that stern frames with sections from 30 up to 150 square inches come to grief? In fact, is it not possible, taking into consideration the enormous strain thrown upon a stern frame by heavy seas striking the rudder of a heavily laden steamer, that the increasing number of cases in which steamers leave port, never to be heard of again, may be ascribed to this careless method, for, the stern frame failing, the rudder goes, leaving the vessel at the mercy of the wind and waves.

I will now attempt to show you how this defective welding can be overcome and actually is overcome. Several years ago the firm with which I am connected had occasion to deal with some large pieces of iron which had been welded by screws in the manner already described. A series of tests was applied; the unsatisfactory result decided to our minds that the butt joint hand-welded by screws was a wrong practice. We decided, therefore, upon making a series of test welds upon large sections under a powerful steam hammer. The results obtained were so successful that we came to the conclusion that to obtain properly-welded stern frames we should have to put down a hammer and cranes specially designed to admit a stern frame of the largest size, and allow the application of the hammer to any part of it. This was done. The hammer is shown on Fig. 12. It has a clear space of 30 feet between the standards. The piston-rod weighs 2 tons and has a fall of 4 feet. With steam on the upper side of the piston the blow given is equal to 30 foot-tons. By this method, when preparing for welding, the scarfs of the frame are cut as shown by the wooden model and by Fig. 13. They are beveled from the center

(Continued on page 33.)

* Paper read before the Cleveland Institution of Engineers, England.

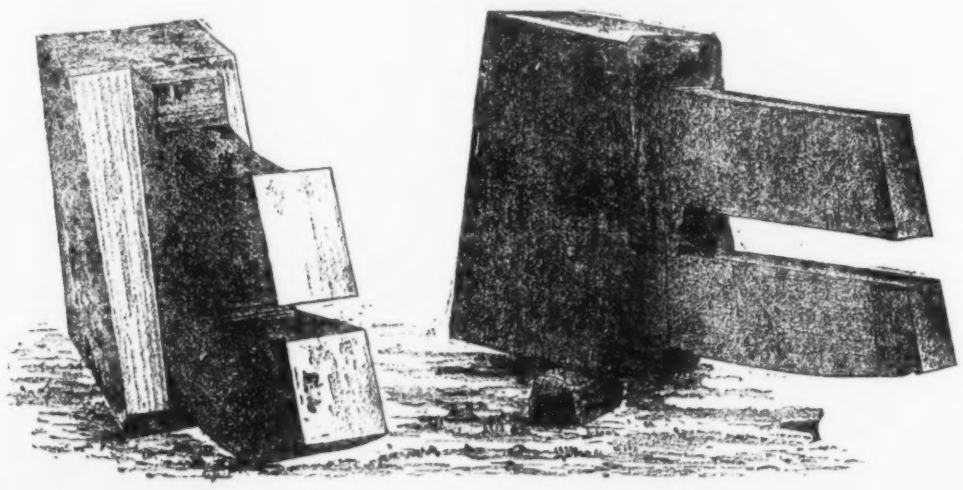

Fig. 1.—Specimen D.

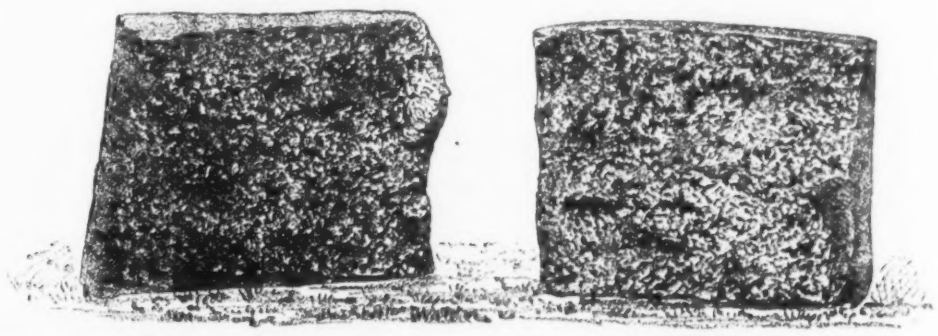

Fig. 2.—Specimen F.

Fig. 3.—Model of Scarf.

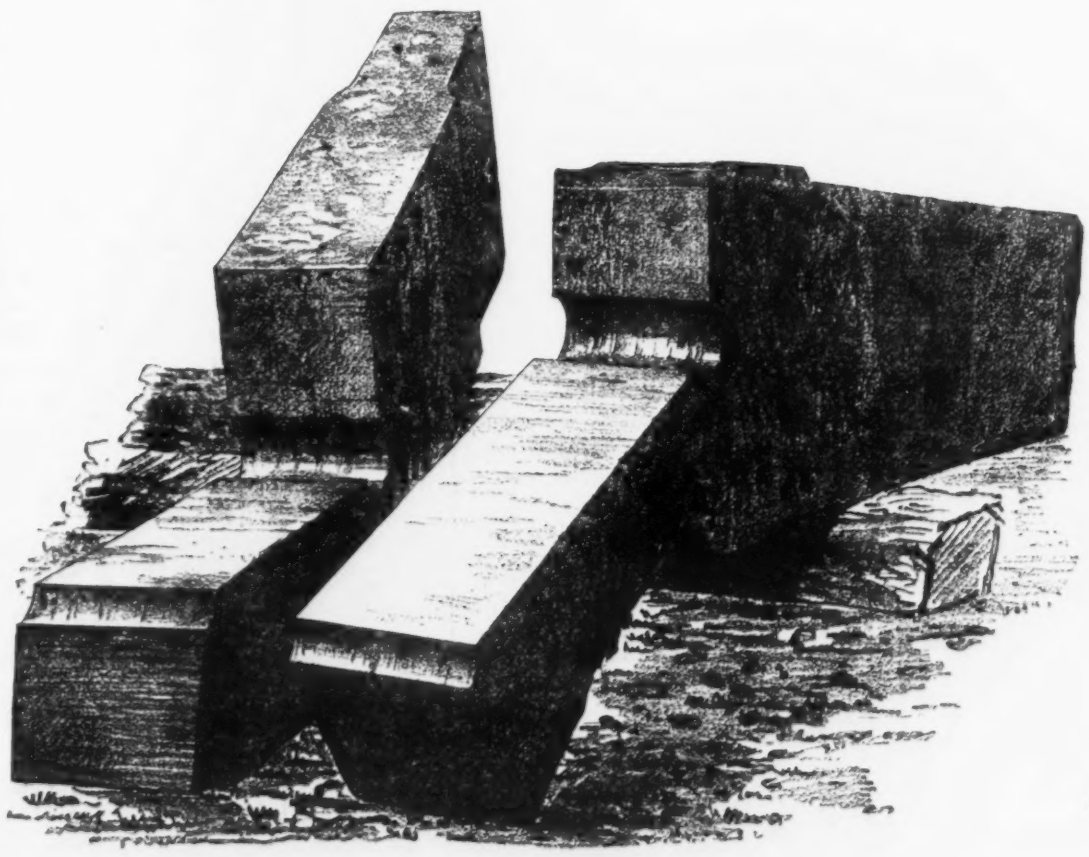

Fig. 4.—Specimen E.

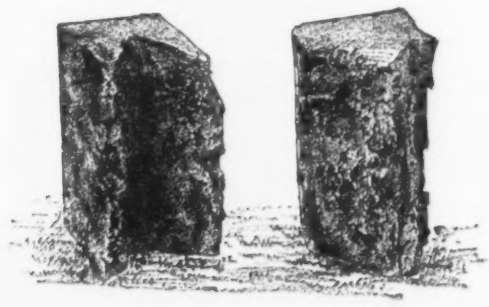

Fig. 5.—Specimen C.

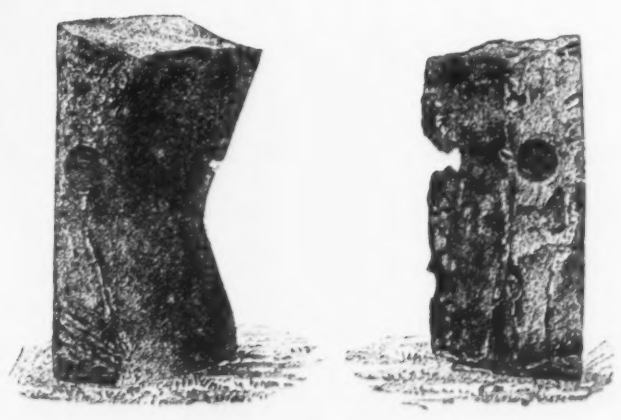

Fig. C.—Specimens A and B.

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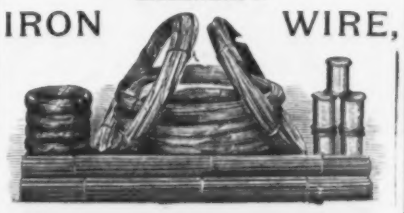

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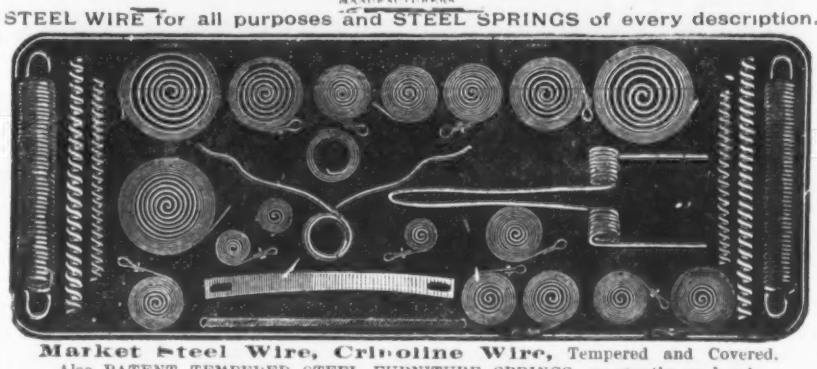

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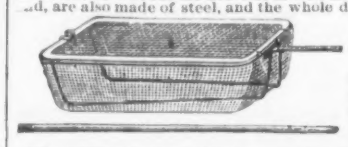

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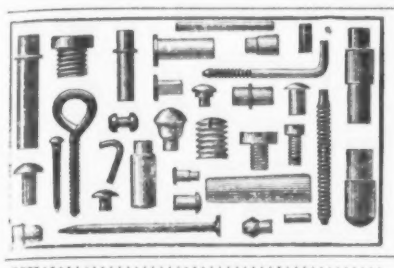

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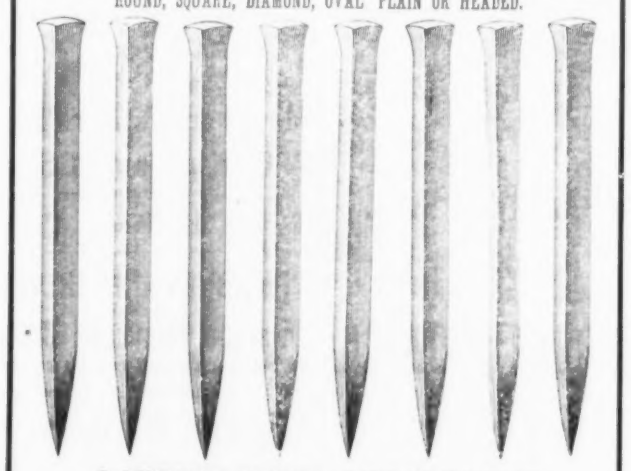

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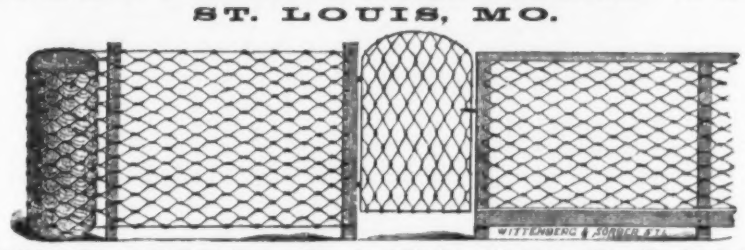

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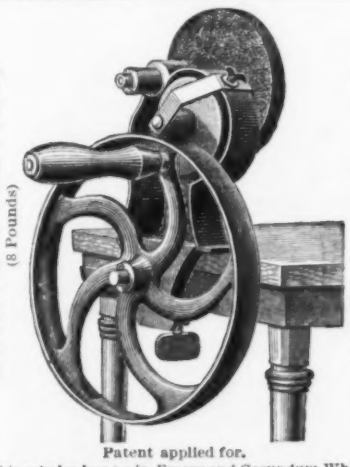

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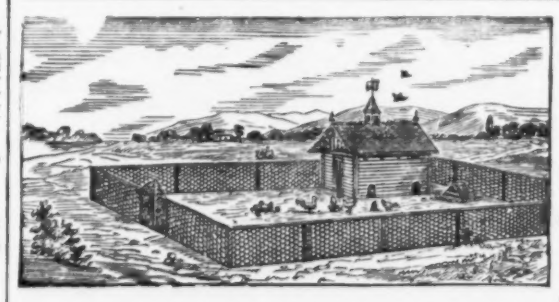

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Manufactured by ALBERT ASSMAN & SONS.
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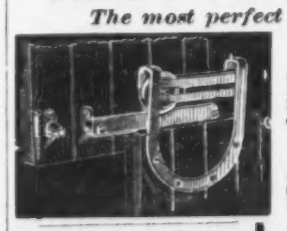

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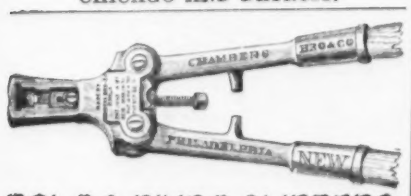

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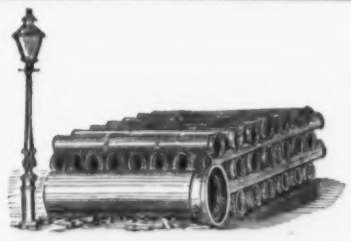

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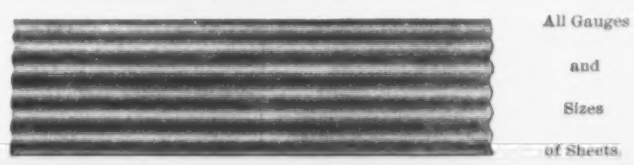

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The Distribution and Proportions of American Blast Furnaces.*

BY JOHN BIRKINBINE, PHILADELPHIA, PA.

Much has been contributed to the "Transactions" of the Institute concerning the construction and operation of American blast furnaces, but the following compilation is offered as possibly furnishing additional information upon the general features, dimensions, locations, capacities, &c., of the blast furnaces of the United States, while, incidentally, the ores upon which they rely are noted in a general way. The paper is presented chiefly as a compilation, and the figures given are selections from most reliable sources, or averages calculated, placed for convenient reference, with a view of assisting those who consult the "Transactions" in determining the relative merits and importance of various sections of the country. The scope of the paper has been restricted to as few topics as possible, and all the details of special plants or notable outputs have been ignored. While every effort has been made to give correct figures and data, the changes which are constantly taking place in the iron-producing industry will undoubtedly, by the time the paper is in print, develop some errors.

It is difficult to determine which of the blast-furnace plants of the country should or should not be considered as upon the active list. A number which have not been operation for years are still reported as active, some of which will scarcely be put in blast again, and others are handicapped so that they can only operate in times of abnormal profits. It is therefore scarcely probable that there are over 600 blast furnaces in the United States which can properly be considered as active, but so many considerations affect the various plants that, it being impossible to determine the exact number, I have relied upon reports as presented by the American Iron and Steel Association. Concerning the number of plants which could be stricken from the list, the secretary of this association says: "In January last (1885) we enumerated 669 furnaces, which included many stacks which had not been in blast for a very long time, and others which could not be operated except during short periods of exceedingly high prices for pig iron. We have gone over this list very carefully and have eliminated 10 anthracite, 19 bituminous and 49 charcoal furnaces, or 78 in all. While most of the furnaces thus dropped have been abandoned, we omit some which are not likely to be operated again, unless prices rise very high and stay high for a time, and even then the majority of them will be found unfit for use without being refitted and practically rebuilt. Making due allowance for four furnaces rebuilt in the past six months, the net reduction in the total number of furnaces is 74, which leaves 595 as the number of furnaces in the United States either in blast or likely to be blown in when trade shall warrant. To this number will shortly be added several furnaces which are now being rebuilt and others in course of erection which are entirely new." As, however, the purpose of this paper is to discuss the location, equipment and the operation of the blast furnaces of the country, the subject will be treated for the present as the published records up to January 1st, 1885, indicated the condition of the industry.

At the close of the year 1884 there were 669 blast furnaces in the United States reported upon the active list. Of this number 230 employ charcoal, 220 bituminous coal and coke, and 219 anthracite coal, as fuel. During the year less than one-half of the furnaces were in operation, and their product amounted to 4,589,630 net tons, or 4,097,868 gross tons. To produce this metal there were consumed 7,213,764 gross tons of domestic ore, and 439,183 gross tons of foreign ore, making a total of 7,652,947 gross tons of ore used, or 1.87 tons of ore per ton of pig iron. The fuel consumed in the blast furnaces to smelt this ore was as follows:

	Gross tons.
Coke	3,697,275
Anthracite coal	1,543,688
Bituminous coal	326,986
Charcoal, 50,577,153 bushels, equivalent to	421,476
Making a total of	5,989,425

In this estimate 120 bushels of charcoal are assumed as equivalent to 1 gross ton. This is a little less than 18 pounds per bushel, and is probably as close an approximation as can be made for the country at large. In addition to the ore above mentioned, a considerable amount of mill and forge cinder was used in our blast-furnaces; and this will probably not fall short of 500,000 net tons. This quantity would bring the average consumption of ore per ton of iron up to about 2 gross tons, but, as the amount of mill cinder used is indefinite, it will be better to base comparisons upon data collected by the American Iron and Steel Association, published in their *Bulletin*, which shows that, independent of the amount of cinder employed, the State using the richest iron ore was Illinois, where 1.45 tons of ore were required to produce 1 ton of pig iron. West Virginia follows next with 1.46 tons; then Michigan with 1.57 tons, Missouri and Wisconsin with 1.66 tons. In Ohio, 1.76 tons, and in Pennsylvania 1.83 tons, of ore were required to produce 1 ton of pig iron. The leanest ore was used in Maryland, where 2.06 tons were necessary for 1 ton of pig iron. The States showing the richest ores depend almost entirely upon the Lake Superior ores or the specular ores of Missouri for their supply, while Maryland relies almost wholly upon carbonates. The yield of the magnetites of New Jersey show that State as using 1.9 tons of ore, while New York requires 2.02 tons per ton of iron made. Pennsylvania shows a higher percentage of ore than would otherwise be the case, on account of the large amount of foreign ore imported. In the Southern States the amount of ore used per ton of iron varies from 2.28 in Virginia to 2.32 in Georgia and Alabama.

The data above referred to show that in smelting the ores in the various States the average amount of fuel consumed to produce 1 ton of pig iron was as follows: Anthra-

* Read at the Halifax meeting of the American Institute of Mining Engineers.

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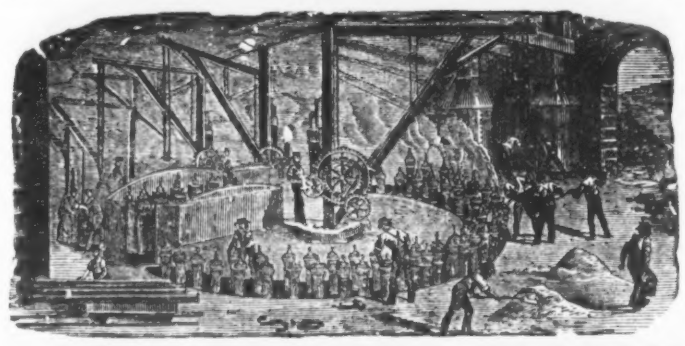

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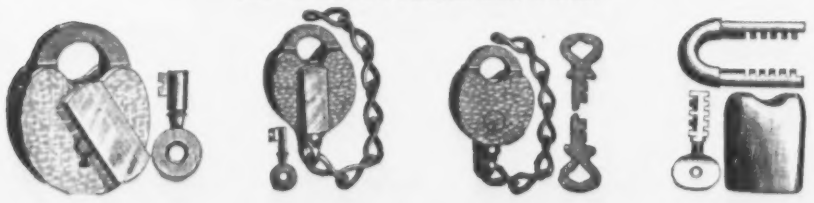

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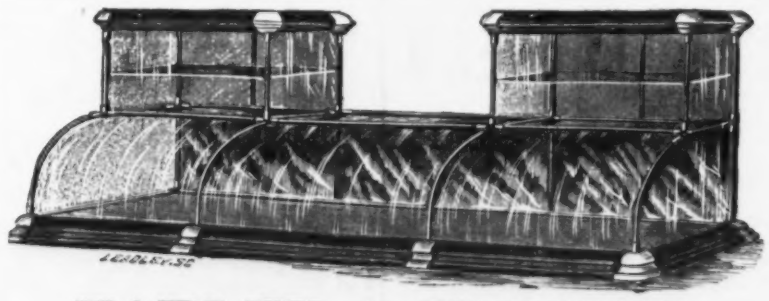

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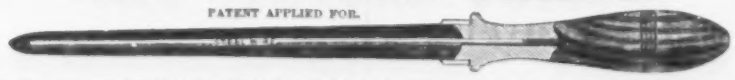

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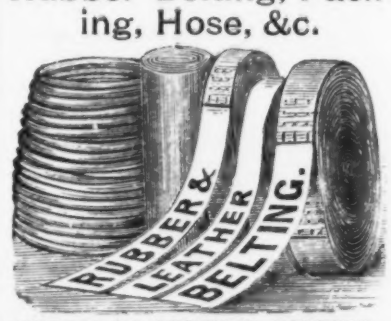

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cite, 1.50 tons in Pennsylvania to 1.61 tons in New York, an average of 1.52 tons; bituminous coal and coke, 1.30 tons in Illinois to 2.13 tons in Kentucky, an average of 1.36 tons for the whole country; charcoal, 97 bushels, equal to 0.81 ton, in Michigan, to 172 bushels, equal to 1.45 tons, in Virginia, an average of 123 bushels or 1.03 tons per ton of iron for the entire country. In the anthracite districts coke is generally mixed with the harder fuel to encourage better driving of the furnace, and as the industry is distributed in the States of New York, New Jersey and Pennsylvania, with a few establishments in Maryland, there are scarcely sufficient data to form any general comparisons of operation; but in the furnaces using bituminous fuel and charcoal we do not find in every case that a low fuel consumption accompanies the richer ores. Thus, the amount of bituminous fuel employed in Georgia, Alabama and West Virginia is practically the same, although in the two States first named 2.32 tons of ore are required to make 1 ton of pig iron, while in the latter State 1.46 tons are demanded, and the coke of Alabama and Georgia is not as good as that generally employed in West Virginia. Similarly, Pennsylvania, Virginia and Missouri use the same amount of bituminous fuel to produce 1 ton of pig iron, although the quantity of ore required is 1.83 tons in Pennsylvania, 2.28 tons in Virginia, and 1.66 tons in Missouri. This may be accounted for in part by remembering the large number of old furnaces in Pennsylvania, as compared with the other States. Ohio, with ores which make a ton of pig iron with 1.76 tons of ore, requires 1.74 tons of fuel, but a considerable portion of the coal used in Ohio cannot be considered as of superior quality.

The distribution and arrangement of the blast furnaces of the United States is itself a topic which would exhaust the limits of a large paper if an attempt was made to go into detail. Pennsylvania stands first as an iron-producing State, followed in order by Ohio, Illinois, New York, Alabama, Michigan, Virginia and Tennessee, all of which produced in 1884 over 100,000 tons of pig iron. In the 23 States and one Territory in which pig iron was produced in 1884, charcoal was used in all but Illinois, New Jersey, West Virginia, Colorado and Indiana; and in the States of Michigan, Connecticut, Texas, Massachusetts, Oregon, California and North Carolina, and in Washington Territory, charcoal was the only fuel used. From the data above given it is evident that the blast furnaces of the United States are distributed over an extensive area, and employ quite a variety of ores and fuels.

The ores used come from localities even more scattered than the furnaces, and are of all kinds. Starting at the northeastern part of the country, we find that in Maine limonite ore has been used. In Northern New York, along Lake Champlain, rich magnetic ores abound; toward the St. Lawrence River, limonites are used; in the center of the State, fossil ores are mined; while along the boundary of Massachusetts, Connecticut and New York, both limonites and magnetites are obtained, and a considerable industry has lately been established to develop deposits of carbonates. New Jersey obtains its supply chiefly from its local mines of magnetic ores. In Pennsylvania both limonites and fossil ores abound through the eastern and central portions, and a considerable quantity of magnetic ore is also obtained from the same localities. The most important single operation is at Cornwall Ore Banks, in Central Pennsylvania, where over 1000 tons per day are mined from a deposit estimated to have above ground from 30,000,000 to 40,000,000 tons. In Maryland limonites and carbonates (the latter existing in pockets or kidneys) are chiefly used, and in Virginia limonites and magnetites, particularly the former, are the main dependence. North Carolina and Eastern Kentucky sustain a few charcoal blast furnaces upon deposits of limonite and magnetite. West Virginia has some good ores, but its furnaces rely largely upon ores brought from Lake Superior and from Missouri. In Georgia, and more particularly in Alabama, the contiguity of brown and red hematite ores to coal deposits or heavily-timbered areas has brought that section into unusual prominence. In Tennessee, as in Alabama, there are practically two principal ore districts, which may be described generally as following the north and south courses of the Tennessee River. In the western part of the State, where the river flows in a southerly direction, fossil ores abound, and are smelted in coke furnaces, while in the more central portions of the State, where the Tennessee flows northerly, the limonites are plentiful, and are smelted chiefly with charcoal. The same may be said to exist in Alabama, but in this case the line of fossil ores are to the westward of the line of the limonite district.

Northeastern Ohio is well supplied with blast furnaces, but obtains only a small part of its supply from local mines, most of the ore for Eastern Ohio and Western Pennsylvania being brought from Lake Superior and smelted with Connellsville coke, although a local block coal is found immediately at furnaces which were originally constructed mainly to use this fuel. In Central and Southern Ohio and in Kentucky raw coal is used to a greater extent than elsewhere in the country, and the dependence of the furnaces is principally upon local carbonate ores mixed at times with Lake Superior and Missouri ores. A group of blast furnaces, some using raw coal and some depending upon charcoal as fuel, located in Southern Ohio and Northern Kentucky, are generally recognized as the Hanging Rock district. Indiana is deficient in local ore supplies, and the attempts to establish the industry with the block coals found in that State cannot be said to have proved advantageous. Illinois is without local ores and the furnaces are centered chiefly in the northern portion, and obtain their supply from the Lake region, although in the southern districts, along the Mississippi river, plants have been constructed to use the rich specular ores of Missouri. These ores also form the basis of the iron industry in Missouri, and are obtained from the noted deposits of Pilot Knob and Iron Mountains and from the beds of softer hematites in the central part of the State, these latter, however, being chiefly smelted with charcoal.

Texas has a small iron-producing capacity, relying upon limonite ores, and charcoal for fuel. Michigan uses charcoal alone as fuel, and smelts Lake Superior ores, which, owing to their richness, permit of remarkably good work and large yields. Wisconsin, while depending principally upon Lake Superior ores, also has some local supplies of hematite, one peculiar deposit in the eastern part of the State being known as "Flax seed" ore, from its close resemblance in size and appearance to that grain. Minnesota, Colorado, California, Oregon and Washington Territory have each one furnace plant, all using charcoal, except that in Colorado, and deposits of good ores are claimed to exist in all of them. The only furnace in Washington Territory depends on ores from British North America.

The sizes of the blast furnaces in the United States are scarcely less varied than the ores they use; and the method of construction and the mode of equipment exhibit fully as many differences as the structures themselves. One remarkable feature, however, is the pertinacity with which various districts, although close together, maintain special features, either of construction or equipment, by which they may be readily recognized.

(To be continued.)

The Career of Sir Joseph Whitworth.

Joseph Whitworth was born in Cheshire on the 21st of December, 1803. His father looked after his education until he was 12. He was then sent for 18 months to an academy, after which he was drafted into a cotton mill kept by his uncle. At 18 he changed the mill for the workshop. At 21 Joseph removed to London and worked for Maudslay & Clements for eight years. Maudslay was a man who thought much about tools, and Clements was a gentleman who helped Babbage with his calculating engine. There was something to be seen in the London shop, and Joseph looked about him, keeping his eyes wide open and his own counsel. In these days the mechanic had to do his work entirely without the aid of machinery. His whole tools consisted of hammer and chisel, a primitive lathe and an equally primitive screw-cutting machine. When he had to measure anything it was with a 2-foot rule, with scores showing the eighths of an inch. A finer measure was never thought of! When a rough metal surface had to be made plain it was done by means of a steel scraper. The result was that the machines produced were, from their mechanical imperfections, the source of continual annoyance. In Watt's time he could not get an engineer to bore a cylinder with the very nearest approach to the truth.

Joseph Whitworth saw that if the mechanic was to supply the growing demand for machinery he must be assisted by better tools, and from this time until middle life he worked with painstaking patience and assiduity to supply the want. The first tool to which he turned his mind was that wonder of the mechanic's shop, the planing machine. He saw that steam-valves, the tables of printing presses, stereotype plates and surface plates of all kinds required to be produced with a trueness of surface to which they did not at that time most distantly approach. Could the iron not be planed like a piece of wood? He turned the thought over in his mind. He worked at the idea, and in 1830 he produced, after having made various unsuccessful attempts, a planing machine. He afterward constructed one capable of making a clean cut of 40 feet. So exactly can surfaces be made with this machine that if one plate is placed on the top of another it will not come in contact with it, but float on the film of air between the plates, which is only expelled by slow degrees, when again the plates embrace each other so firmly that they cannot be separated without the application of the very greatest power. The economy of the planing machine was as remarkable as the precision of its workmanship. Before Joseph Whitworth made his machine it took 12/ a foot to make a plane surface for the grinding and scraping process. After the invention of his machine the same surface could be planed, and much better, for 1d.

Another difficulty the mechanics of those days had to contend with was the inconvenience continually arising from the variety of threads employed by various manufacturers in the bolts and screws so indispensable in the construction of all kinds of machinery. The system rendered it necessary that in the refitting shops of railway companies and shipowners there should be sets of screw-making machines to correspond with those of every manufacturer who supplied the engines. The difference in the screw-threads was a source of continued vexation. Whitworth directed his attention to the matter. He worked at the problem laboriously for a long time, and in the end he solved the difficulty. The result is—although very few, indeed, ever think of it—that his system has been adopted throughout the whole world, and in every machine, wherever constructed, the same screw is used for a given diameter. But this was not all. Joseph Whitworth rightly held that the power of producing a plane surface was the secret of all excellence in mechanical work, and without that power perfection could not even be approximately reached. Next, however, to the production of a plane surface was the power of accurate measurement. So far from being satisfied with an instrument capable of measuring $\frac{1}{8}$ or even $\frac{1}{4}$ inch, he held that machines of genuine excellency could not be produced unless the mechanic could measure $\frac{1}{10,000}$ inch. In the course of time he was able to construct micrometers capable of measuring the millionth part of an inch! and he was also able to show how $\frac{1}{40,000}$ part of an inch could be readily felt and gauged. He constructed measuring machines so fine and sensitive that they showed instantly how much a bar of steel 1 yard long was lengthened when touched by the hand!

These machines had all been the product of hard labor. They were the results of the application of a severely practical mind to the solution of severely practical problems. They brought him into notice among me-

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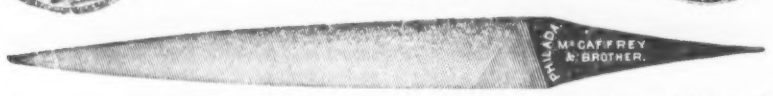

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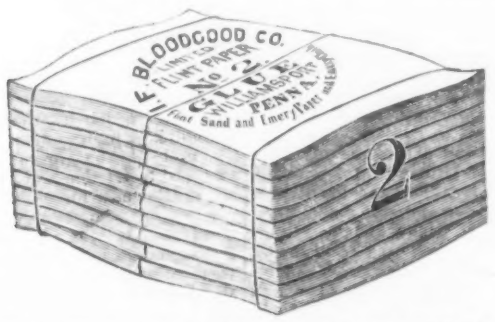

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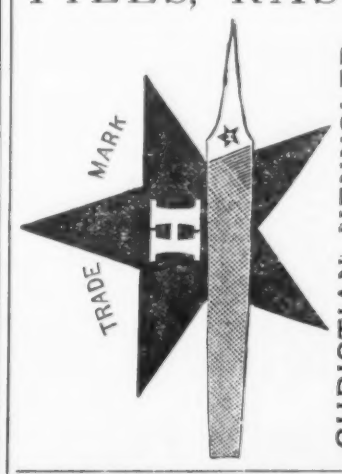

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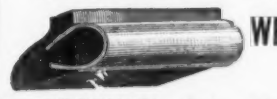

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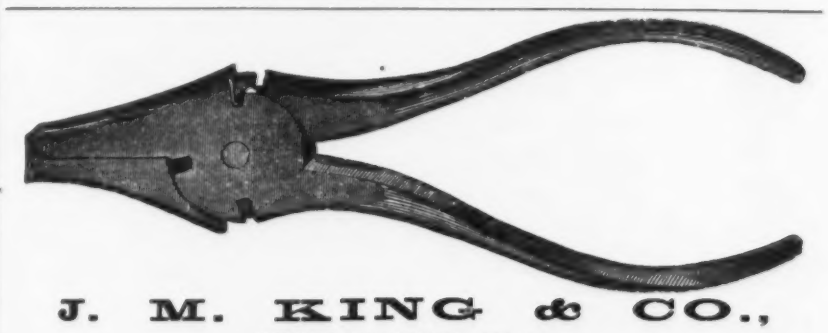

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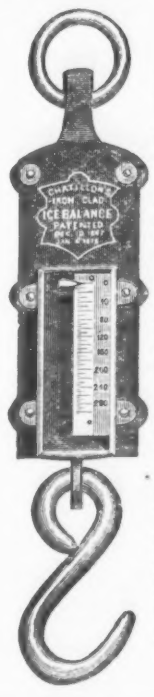

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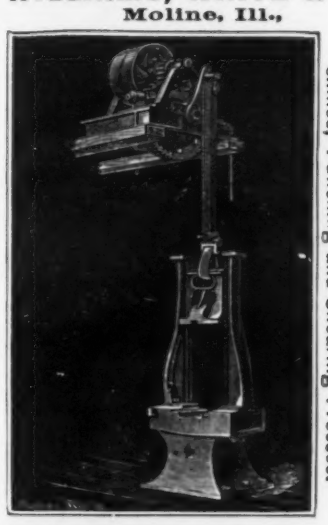

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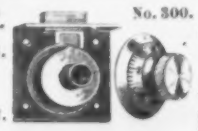

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chanics. A certain invention of his, however, did more to popularize his name than all the others This was nothing more nor less than his street-sweeping machine. From the production of implements of construction by a rapid transition Whitworth turned his attention to the production of implements of destruction. When the Crimean war broke out the Government required 20,000 rifles, and the Birmingham gun-makers were unable to produce them in time. What was to be done? The authorities applied to Parliament for powers to build a small-arms factory. Whitworth was one of the witnesses examined. He gave important evidence. He showed the Government had not data on which to go; they were going to take a step in the dark. One rifle shot well, and another shot badly, but no one could tell the reason, and there appeared to be no difference between the weapons. He pressed on the Government to discover the secret of a good rifle by experiment; and, once the secret was discovered, the barrels could then be made by macinery.

A suitable gallery was erected for Whitworth. It was no sooner up than it was blown down. Another was immediately erected. It was 500 yards long and 20 feet high and 16 wide. It was furnished with movable targets, and screens of thin tissue for tracking the course of the bullets. He was soon able to satisfy himself that the best twist for a rifle bullet was one in 20 inches, with a minimum diameter of 0.45. The experiments continued for two years, and Whitworth was soon able to produce a gun which could beat the Enfield—then the Government weapon—all to picces. In 1860 there was a competition opened to all the world. The object was to bring to the test the most perfect rifle that could be invented. The Whitworth won the prize easily, and in the following year, when a similar competition was held, no competitor came forward to try conclusions with the Whitney rifle. In 1860 the Queen inaugurated the first prize meeting of the National Rifle Association by firing the first shot from a Whitworth gun. The gun was fixed on a mechanical rest specially constructed by Sir Joseph, and was pointed at a target placed at a distance of 400 yards. The Queen pulled the trigger by means of a silken cord. A bull's-eye was recorded, the ball having struck the target only 1½ inches from the center. The Martini-Henry rifle now in use practically embodies every one of Sir Joseph Whitworth's discoveries. The twist in the Martini Henry is one in 22; in the rifling a heptagon is substituted for a hexagon. The length of the bullet is 2.93 diameters, substantially the Whitworth proportion.

Having made his name famous as a small-bore rifle-maker, he turned his attention to heavy artillery. He had already shown both by demonstration and experiment that a rifle bullet should be 3 diameters in length. He now went on to show that the same proportion applied to heavy as well as light ordnance. But he further proved that the same lines which marked the body of a bird and helped its flight would also, if applied to a projectile, greatly extend its power and range. In short ranges it was of little consequence that the bullet should be tapered off toward the rear, but in long ranges it was essential. Having made these investigations, he soon astonished the world by producing a gun capable of throwing 2½ cwt of iron a distance of 6½ miles. By his experiments he also made clear another important fact. He showed that flat-headed balls could penetrate steel plates even when they struck them at a very acute angle.

From the construction and form of heavy guns he turned his attention to the substance from which they are made, and here he made the great discovery with which his name will ever be associated. Very early perceiving that gun metal must be improved, he hailed with the utmost satisfaction the invention of Bessemer. He found, however, and to his dismay, when he split up an ingot of Bessemer steel, it was filled in certain parts with air cells. These cavities are the bugbear of heavy artillery, and, indeed, of all kinds of firearms. Could the air cells not be expelled? Was it not possible to cast Bessemer steel without these hollow spaces? Both France and Germany had labored to get quit of the cavities and had failed. Whitworth thought much and experimented more. He found that once the metal had got into a semi-fluid state it was then wholly impossible to expel the air. When, however, he applied pressure to the steel when it was in a state of complete liquefaction he got encouraging results. He went on his way. Light increased on him as he advanced. He found that success depended on pressure, and that not until the pressure had been increased to 6 tons to the square inch could the air bubbles be crushed out of the liquid steel. Then the further discovery came into view that the larger the mass of fluid metal operated on the more certain was the result. His largest press developed a force of 8000 tons. Whitworth's compressed steel soon carried all before it. It was thoroughly sound and uniform throughout, and in point of strength and ductility without a rival.

But it was evident to the mind of Sir Joseph that the very best armor to resist his own guns would be armor composed of the very same metal as themselves. He was soon able to produce plates of compressed steel, and in 1877 he brought to the test what he denominated his "impregnable armor plating." The result was astonishing A Palliser shell weighing 250 pounds, fired from a 9-inch gun, with 50 pounds of pebble powder, at a distance of only 50 yards from the target, was broken up into innumerable small fragments. The shell only left a mark on the target 1 inch deep at its greatest impression. But if a gun made of compressed steel could render such beautiful results, and plates of the same steel made such magnificent armor, it was evident that extraordinary results might also be looked for if the projectiles themselves were formed of compressed steel. This thought led to the construction of the Whitworth shells, and thus by the invention of Sir Joseph Whitworth our entire weapons of offense and defense were completely revolutionized.

The Tidewater Oil Co. have secured the right of way for an oil pipe from the wells in Pennsylvania, through New Jersey to Constable Hook, adjoining the great Standard works. The distance is a trifle over 300 miles. The pipes, which are 6 inches in diameter, are to be 3 feet below the surface. Through the State of Pennsylvania four large pumps are stationed to force the oil. The capacity of the pipes is 10,000 barrels daily. The Jersey terminus of the pipe will be a little north of the Rahway River, where it will cross to Staten Island and thence to the Hook. The cost of this enterprise will be $2,000,000.

Street Pavements.

At a meeting of the American Society of Civil Engineers, Capt. F. V. Greene, of the United States Engineers, read an interesting and important paper giving the results of exhaustive observations upon the extent and character of street traffic in the United States as influenced by the character of the pavements, the width of the streets, &c. The paper directed attention to the large sums invested in street pavements, amounting to about $250,000,000 in the 20 principal cities of this country, to the desirability of keeping systematic records of the traffic over the various pavements, and their wear under this traffic; and to certain observations upon traffic recently made under the writer's direction. After referring to the observations made by Haywood and others in London, by Deacon in Liverpool, and by the French engineers in Paris, the writer described in detail the manner in which his own observations were taken. In brief, they were first recorded by one or more observers by the punch and "trip-slip" method in use by car conductors, slips of different colors being used for vehicles of different tonnage. A summary of each hour's observations was then transferred to a daily report made on a printed form. These were then sent to the writer, by whom the computation of total tonnage—tonnage per vehicle and tonnage per foot of width—was made. The observations were continuous from 7 a. m. to 7 p. m. on six consecutive days at each place. The accidents to horses were also observed and recorded in three classes, viz., falls on knees, falls on haunches and complete falls. Record was also made of the width and grade of the street, state of the weather, temperature of the air, average speed of the vehicles and length of street on which accidents were observed and recorded. On the back of the printed form of report full instructions were given for the observers, especially in regard to the weight of different kinds of vehicles, and every precaution was taken to have the observations made on a uniform system and to eliminate the personal equation of the observer and leave as little as possible to his judgment. Each day's report was subscribed and sworn to by the observers before a notary public; these reports were submitted to the members of the society present for their examination. The observations were made on 36 various streets in 10 different cities, viz.: New York, Philadelphia, Chicago, Boston, St. Louis, New Orleans, Washington, Buffalo, Louisville and Omaha. The pavements on the streets observed were of granite, asphalt and wood.

In compiling the results as to traffic the standard for comparison was the average daily tonnage per foot of width. This was found to range from 273 tons on Broadway in New York to 7 tons on Olive street, in St. Louis. The average weight per vehicle varied from 0.68 ton on Fifth avenue, in New York, to 2.08 tons on a part of Wabash avenue, in Chicago. Several remarkable instances were given of the manner in which smooth asphalt streets have drawn the traffic away from stone pavements—the most noticeable instance being in St Louis, where, on Olive street, paved with granite, the daily traffic per foot of width is only 7 tons, while on Locust street it is 103 tons, the two streets being parallel, adjacent and similar in every respect, and paved at the same time. Comparison was also made with the London observations, showing a very much larger traffic (as high as 422 tons on one street) in the latter city, and the cause of the difference was stated to be the absence of street cars and the large number of cabs and omnibuses thus rendered necessary. Reference was also made to the observations of Messrs. Deacon and Stayton, in England, on the comparative wear of different classes of pavement under different amounts of traffic as actually observed, and the desirability of keeping such reports by municipal engineers in this country was pointed out.

In regard to accidents the standard for comparison was the distance traveled before an accident occurred. This was obtained by multiplying the distance over which the observations were recorded by the number of horses and dividing the product by the number of accidents. The general result was: On asphalt, 583 miles; granite, 413 miles; wood, 272 miles. There were only three sets of observations on wood, and hence as to this class of pavement the results are inconclusive. As to granite and asphalt, the large number of observations (over 800,000 horses and 81,000 miles traveled) justified the conclusion that fewer accidents occur on asphalt than on granite. This agreed with the result of similar observations in London, although in the latter city, from local causes, the accidents on each class of pavements were about three times as numerous as in the cities observed in America. In classifying the accidents it was found that the falls on knees were much more numerous on granite pavements than on asphalt, whereas the falls on haunches were more numerous on asphalt than on granite. The cause of this was pointed out—the granite blocks being too wide (about 5 inches instead of 3) to afford a proper footing for the horses; and the falls on haunches on asphalt being due to sudden pulling up and turning of the horses, as noted in nearly every case in the reports.

From Captain Greene's tables, which are marvels of minuteness and care, it is evident that the heaviest traffic, both in this country and in Europe, seeks the asphalt pavement in preference to either granite or wood; and although there are as yet no trustworthy statistics regarding first cost and maintenance, Captain Greene favors asphalt as the universal pavement.

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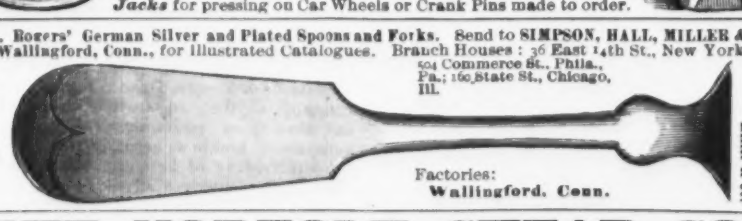

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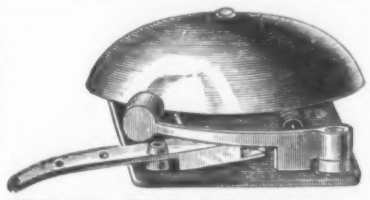

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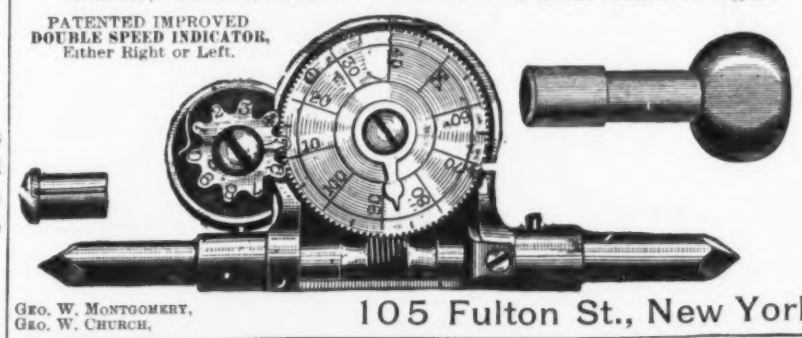

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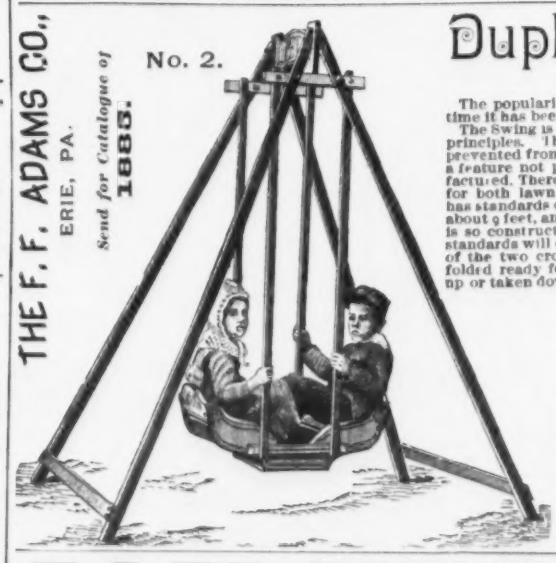

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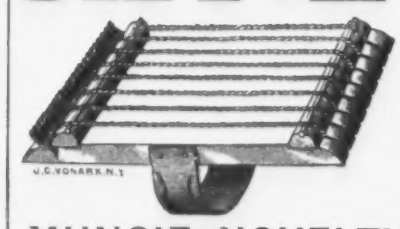

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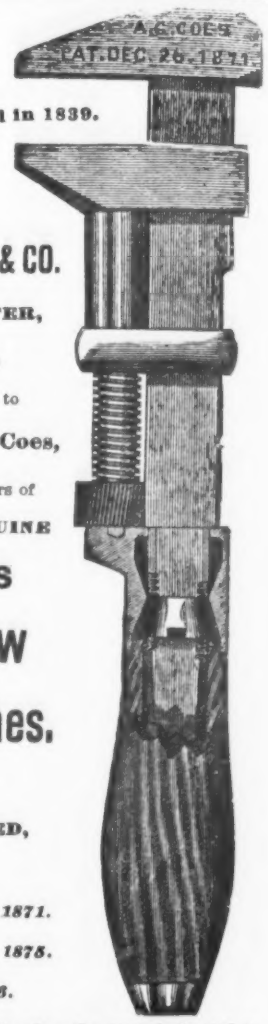

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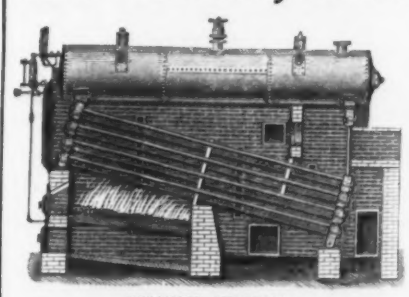

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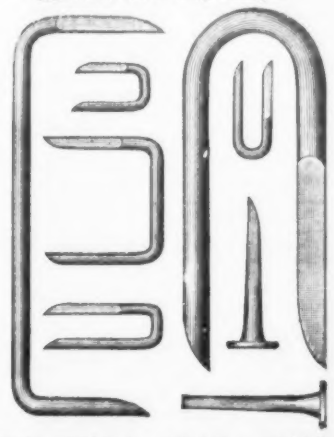

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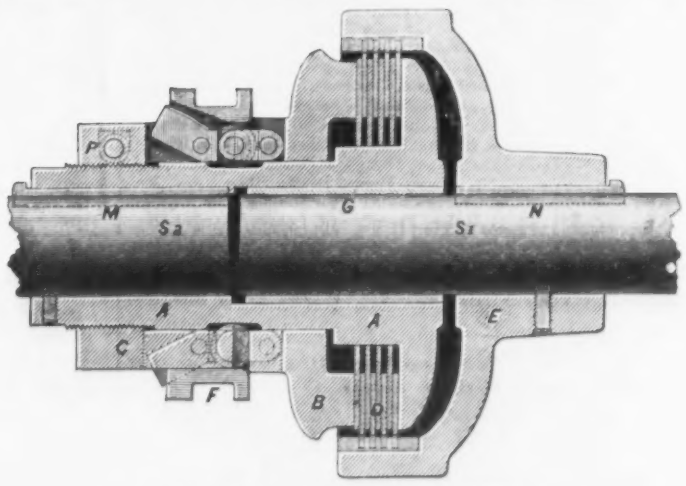

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Rare Minerals for Manufacturing Purposes.

In an article on the above subject the London *Engineer* submits the following particulars obtained from a gentleman (Mr. Gregory) intimately acquainted with the subject:

The crystalline diamond is not good for boring purposes, because it has cleavage planes, and splits along those planes in boring operations. There is an inferior South African diamond which in the rough is rounded outside, so as to resemble real bort, and it is known as "Cape bort." In use its rounded surface begins to split off, and the ill effects of the cleavage planes become manifest. It is worth 5/ or 6/ a carat, while real bort, which comes from Brazil, is worth 40/ or 50/ a carat. The Brazilian bort shows some traces of crystallization, or rather of a fibrous radiated structure, but then the pressure acts nearly equally upon it in all directions. The best carbon for boring purposes is "carbonado;" it comes from Bahia, in Brazil, and is amorphous. Some specimens, when fractured, have, says Mr. Gregory, a somewhat spongy texture, others are compact, and bear the same relation to the diamond proper that emery does to the crystallized sapphire. Carbonado is found as small black pebbles in the detritus of rivers; it is associated with gravel, but not usually with the true diamond; its specific gravity varies from 3.012 to 3.416. The compact variety some two or three years ago was worth £4 a carat; now its value is but 30/ to 35/ a carat. The supply is limited, and is in the hands of a few capitalists. It is freely used by Californian mining companies, and for Government work in Australia. The largest consumers in England are the Diamond Drill Co. The commercial advantages of the use of carbonado as compared with steel come out chiefly when excessively hard rocks have to be bored; with soft rocks the advantage, where it exists, is not manifested so strongly. Some of the "crowns" of large drills 10 inches in diameter, armed with the best carbonado, have been known to be worth £2000 each; each piece of carbonado fixed in such drills usually weighs from 4 to 6 carats. The pieces in the small drills used for boring holes for blasting purposes usually weigh from ½ to 1 carat. There is an increasing demand for large pieces of carbonado, which in the long run are cheaper in use than the small ones. An interesting geological problem was solved by the diamond drill in boring the deep well from Meux's Brewery, in London. The boring passed from the upper oölite direct to the Devonian rocks, which are older than the coal formations, and settled the question that there is no coal under the oölite there, or anywhere to the eastward thereof; but the speculation still holds good that possibly coal may be found in Kent or Surrey. Carbonado is specially useful in dressing millstones, and it is reported that it is getting into use in America for turning steel tools. Once a Birmingham firm consulted Mr. Gregory about using a tool for special turning purposes in the place of steel. He recommended a tool made of carbonado, but there were two difficulties in the way. In the first place, the problem of grinding the tool had to be faced; and, in the second, it was necessary to build it up of small parts, because of the minute dimensions of the pieces of raw material. One or two regular diamond polishers were applied to, but would not undertake work so much removed from their ordinary practice, so the manufacturing firm which required the tool put one of their own men at the work for some months; in the end he overcame the difficulties of his unaccustomed task; a carbonado tool was built up of small segments, and in use it was found to be admirably adapted to the purpose for which it was constructed.

Of late years there has been a greatly increased demand for asbestos. The sources of supply are abundant, especially in Australia, but of late much has been sent to England from the United States which is not really asbestos, but chrysotile, which is fibrous serpentine; it includes most of the silky amianthus of serpentine rocks. It is either used by itself or to adulterate asbestos. Chrysotile is a silicate of magnesia, and asbestos is a silicate of alumina; the former occurs in fibers about 2 inches long, and the latter in fibers sometimes as much as 30 inches long; chrysotile contains 12 to 14 per cent. of water. The Greeks named asbestos "amianthus," or "the undefiled," because it could be cleansed by the simple device of throwing it into the fire. At one time asbestos cost about £6 per cwt.; now it can be had from £10 per ton, the difference in price being the result of the operation of the law that supply meets the demand. Mountain leather and mountain cork are varieties of asbestos. Mountain leather occurs in flexible flat pieces, in which the fibers are interwoven; it has much the aspect of leather, and when very compact is known as "mountain wood." A sample of mountain leather analysed by Dr. Thomson was found to consist of silica, 57.65; magnesia, 2.06; lime, 10.0; alumina, 9.5; protoxide of iron, 5.8, and water, 21.7. A sample of mountain wood from the Tyrol consisted of silica, 54 92; magnesia, 26.08; alumina, 1.64; protoxide of iron, 12.6, and water, 5.28 Mountain cork from Piedmont: silica, 57.75; magnesia, 10.85; lime, 14.05; protoxide of iron, 18.90; alumina, 1.95, and protoxide of manganese, 1 85. It has a loose, felt-like texture, and floats on water.

Beauxite is a valuable mineral for the beds of furnaces and for the manufacture of aluminium; the best comes from Beaux, in the South of France; another variety is found near Belfast, and is largely used in the North of England. Cryolite is used as a flux for the beauxite in the manufacture of aluminium. At one time the cryolite itself was used as the source of that metal. Beauxite consists chiefly of alumina and iron, with a little tartaric acid; the white variety contains 21 per cent. of silica. Sometimes beauxite contains enough iron to be regarded as an iron ore. Cryolite, which means "ice stone," is plentiful in Greenland. Its composition is: aluminium, 13; sodium, 32 8; fluorine, 54 2. It is fusible in the flame of a candle, giving off some of its fluorine, which is at once transformed into hydrofluoric acid by the moisture in the air.

Among the mineral curiosities in the collection of Mr. Gregory was some elaterite, otherwise known as "mineral india-rubber," subterranean fungus and elastic bitumen. In the early part of the present century the sole source of supply of this curious mineral was the lead mine of Odin, at Castleton, Derbyshire. At present the mine is unworked, but it is exploited at times by workmen who make arrangements with the owner. Elaterite is said now to be found also at St. Bernard's Well, near Edinburgh; Chapel quarries, Fifeshire; a coal mine at Montrelais; at Neufchatel and on the Island of Zante. The Castleton samples are some of them nearly as soft as size, and the remainder of much the same consistency as india-rubber. They are all black or brownish-black by reflected light, and dark orange red or brown by transmitted light. When a large lump is cut through the center it is often found to be fawn colored in the middle, and it darkens by exposure for a few weeks to the air. It is said to be of a very insoluble nature. Johnston records that when he treated a mass of it with ether but 18 per cent. dissolved; by analysis he discovered it to consist of about 85 per cent. carbon and 12 per cent. of hydrogen, with probably 2 or 3 per cent. of oxygen. Occasionally samples of elaterite are hard and brittle. In the old lead mine of Settling Stones, Northumberland, a mineral rosin somewhat resembling elaterite is found in drops more or less rounded or flattened; these drops incrust the rocky walls of the vein. It is hard, brittle under the hammer, does not melt at 205° C., burns in the flame of a candle, varies from pale yellow to deep red in color and consists of carbon, 85.133; hydrogen, 10.853; ash, 3.256; total, 99 242.

Cæsium is the most electro-positive of all the metals. Its affinity for oxygen is stronger than that of potassium; its basic oxide cæsia is a most powerful caustic, which, when heated, attacks even platinum. Cæsium was one of the exceedingly rare metals discovered by Bunsen and Kirchoff in the early days of spectrum analysis. By boiling down 140 gallons of the water of the Durkheim spring they obtained in the saline residue 1 grain of a salt of cæsium. Ordinary lepidolite contains but traces of cæsium, but a variety found at Hebron, in the United States, yields 0.24 per cent. of the metal. Pisani, however, in 1864, discovered cæsia to the extent of 34 per cent. in a mineral named pollux, obtained from the Island of Elba, in which locality it occurs with petalite. Pollux, of which small specimens are in Mr. Gregory's collection, is colorless, glassy or gum like externally, and fuses with difficulty. It consists, by Pisani's analysis, of 34.07 per cent cæsia, 44.03 silica, 15.07 alumina, 3 88 soda and lithia, 2.40 water, 0.68 lime and 0.68 iron. Pollux colors the blow-pipe flame yellow. It is slowly decomposed by hydrochloric acid, with separation of pulverulent silica.

In the earlier days of his researches on heat Professor Tyndall sought Mr. Gregory for specimens of rock salt adapted to his purposes, and it may here be mentioned in passing that it is a noticeable thing about natural rocksalt crystals that if they have a blue or pinkish hue, and be dissolved in water, all the color disappears in the artificial crystals afterward formed by evaporation. Probably the coloring matter is of an organic nature and is separated by recrystallization. The coloring matter of the quartz crystals known as amyth-st is supposed by geological chemists to be of organic origin. In a collection of out-of the-way minerals, numbering several hundred specimens, many chemical curiosities besides those mentioned are, of course, included.

New Kind of Brick.—Messrs Bleininge and Hasselmann, two German chemists, have, it is said, recently patented a method for obtaining products that will be more resisting to humidity, &c., than ordinary bricks and tiles. After drying and grinding the clay they make a mixture as follows:

	Parts.
Clay	91½
Iron filings	3
Table salt	2
Potash	1½
Elder or willow wood ashes	2

The whole is heated to a temperature varying from 3362° F to 3632° F. At the end of from four to five hours the argillaceous mixture is run into molds, then rebaked in the ovens—always protected from the air—at a temperature of 842° F. to 932° F. The product may be variously colored by adding to the above 100 parts: 2 parts of manganese for a violet brown, 1 part of manganese for a violet, 1 part of copper ashes for green, 1 part arseniate of cobalt for blue, 2 parts of antimony for yellow, and 1½ parts of arsenic and 1 part oxide of tin for white. These products resist the action of acids, and are well adapted for sewers, &c.

A new kind of tube intended to act as a compression stay in the flues of boilers, besides increasing the heating surface and facilitating circulation, was some time since invented and patented by Mr. Bentley, foreman boiler-maker, of Darlington, England. This tube has some obvious advantages over the ordinary conical tubes, but until lately there was a difficulty in making it. Now, however, this difficulty has been entirely surmounted, and Mr. Bentley has arranged with a leading firm to take up his invention and produce the tubes in any quantity which may be required. They vary in form according to circumstances. For a vertical heating furnace boiler they are either cruciform, having four branches, or may have three branches only. For marine boiler fire-boxes they have three branches, and for locomotive four branches—that is, they consist of one main horizontal tube with two vertical branches. There seems no doubt but that more heating surface and greater strength can be obtained by these tubes than in the ordinary way, and in the case of locomotive fire-boxes, there is no reason why by the use of them the roof stays should not be entirely dispensed with. The tubes are made of the finest soft steel; they are welded up solid throughout, and are tested with water before being sent away.

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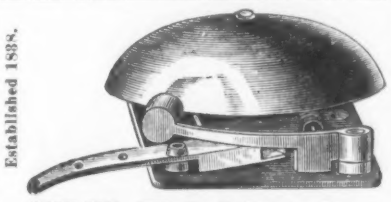

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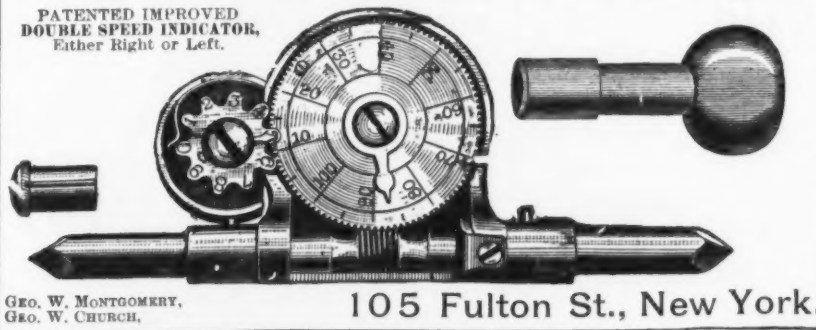

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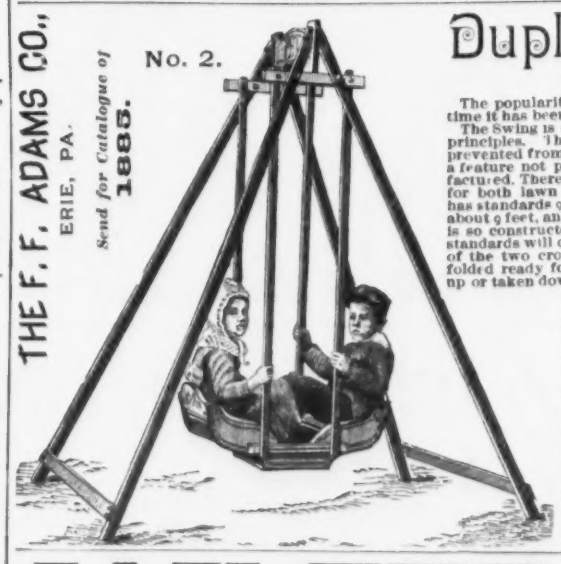

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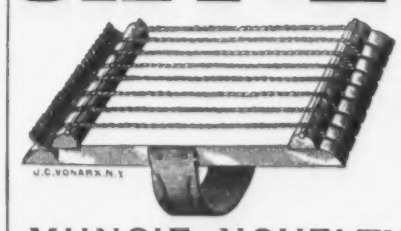

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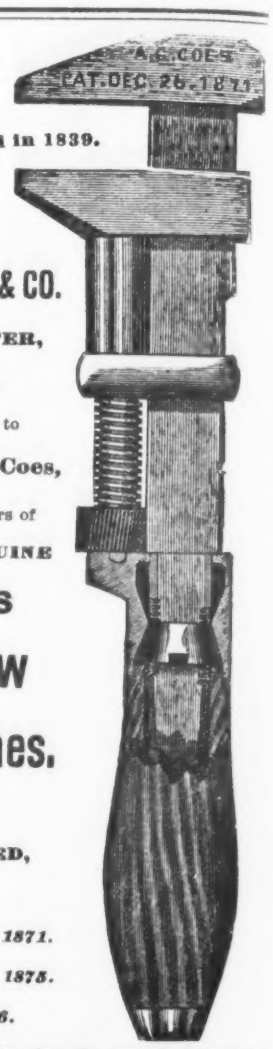

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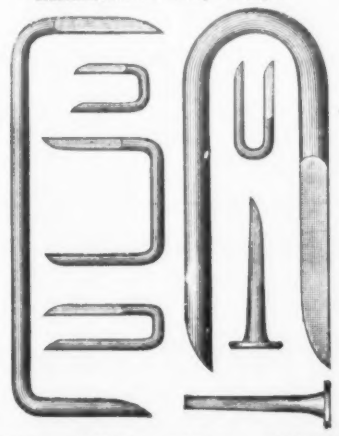

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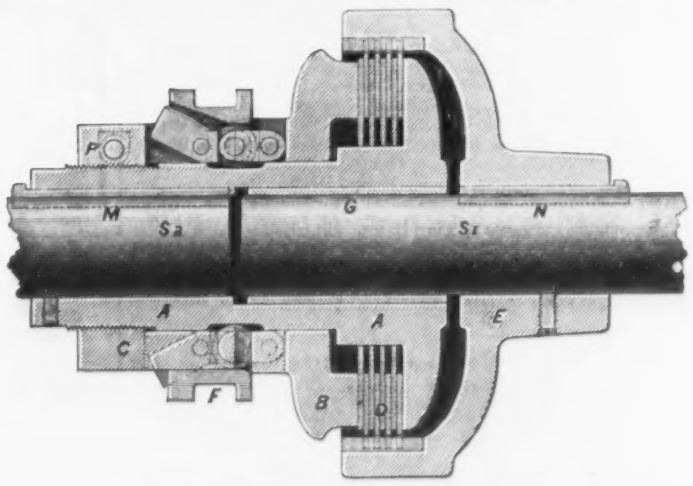

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Sectional View of Friction Clutch.

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Rare Minerals for Manufacturing Purposes.

In an article on the above subject the London *Engineer* submits the following particulars obtained from a gentleman (Mr. Gregory) intimately acquainted with the subject:

The crystalline diamond is not good for boring purposes, because it has cleavage planes, and splits along those planes in boring operations. There is an inferior South African diamond which in the rough is rounded outside, so as to resemble real bort, and it is known as "Cape bort." In use its rounded surface begins to split off, and the ill effects of the cleavage planes become manifest. It is worth 5/ or 6/ a carat, while real bort, which comes from Brazil, is worth 40/ or 50/ a carat. The Brazilian bort shows some traces of crystallization, or rather of a fibrous radiated structure, but then the pressure acts nearly equally upon it in all directions. The best carbon for boring purposes is "carbonado;" it comes from Babia, in Brazil, and is amorphous. Some specimens, when fractured, have, says Mr. Gregory, a somewhat spongy texture, others are compact, and bear the same relation to the diamond proper that emery does to the crystallized sapphire. Carbonado is found as small black pebbles in the detritus of rivers; it is associated with gravel, but not usually with the true diamond; its specific gravity varies from 3.012 to 3.416. The compact variety some two or three years ago was worth £4 a carat; now its value is but 30/ to 35/ a carat. The supply is limited, and is in the hands of a few capitalists. It is freely used by Californian mining companies, and for Government work in Australia. The largest consumers in England are the Diamond Drill Co. The commercial advantages of the use of carbonado as compared with steel come out chiefly when excessively hard rocks have to be bored; with soft rocks the advantage, where it exists, is not manifested so strongly. Some of the "crowns" of large drills 10 inches in diameter, armed with the best carbonado, have been known to be worth £2000 each; each piece of carbonado fixed in such drills usually weighs from 4 to 6 carats. The pieces in the small drills used for boring holes for blasting purposes usually weigh from ½ to 1 carat. There is an increasing demand for large pieces of carbonado, which in the long run are cheaper in use than the small ones. An interesting geological problem was solved by the diamond drill in boring the deep well from Meux's Brewery, in London. The boring passed from the upper oölite direct to the Devonian rocks, which are older than the coal formations, and settled the question that there is no coal under the oölite there, or anywhere to the eastward thereof; but the speculation still holds good that possibly coal may be found in Kent or Surrey. Carbonado is specially useful in dressing millstones, and it is reported that it is getting into use in America for turning steel tools. Once a Birmingham firm consulted Mr. Gregory about using a tool for special turning purposes in the place of steel. He recommended a tool made of carbonado, but there were two difficulties in the way. In the first place, the problem of grinding the tool had to be faced; and, in the second, it was necessary to build it up of small parts, because of the minute dimensions of the pieces of raw material. One or two regular diamond polishers were applied to, but would not undertake work so much removed from their ordinary practice, so the manufacturing firm which required the tool put one of their own men at the work for some months; in the end he overcame the difficulties of his unaccustomed task; a carbonado tool was built up of small segments, and in use it was found to be admirably adapted to the purpose for which it was constructed.

Of late years there has been a greatly increased demand for asbestos. The sources of supply are abundant, especially in Australia, but of late much has been sent to England from the United States which is not really asbestos, but chrysotile, which is fibrous serpentine; it includes most of the silky amianthus of serpentine rocks. It is either used by itself or to adulterate asbestos. Chrysotile is a silicate of magnesia, and asbestos is a silicate of alumina; the former occurs in fibers about 2 inches long, and the latter in fibers sometimes as much as 30 inches long; chrysotile contains 12 to 14 per cent. of water. The Greeks named asbestos "amianthus," or "the undefiled," because it could be cleansed by the simple device of throwing it into the fire. At one time asbestos cost about £6 per cwt.; now it can be had from £10 per ton, the difference in price being the result of the operation of the law that supply meets the demand. Mountain leather and mountain cork are varieties of asbestos. Mountain leather occurs in flexible flat pieces, in which the fibers are interwoven; it has much the aspect of leather, and when very compact is known as "mountain wood." A sample of mountain leather analysed by Dr. Thomson was found to consist of silica, 57.65; magnesia, 2.06; lime, 10.0; alumina, 9.5; protoxide of iron, 5.8, and water, 21.7. A sample of mountain wood from the Tyrol consisted of silica, 54 92; magnesia, 26.08; alumina, 1.64; protoxide of iron, 12.6, and water, 5.28 Mountain cork from Piedmont: silica, 57.75; magnesia, 10.85; lime, 14.05; protoxide of iron, 18.90; alumina, 1 95, and protoxide of manganese, 1 85. It has a loose, felt-like texture, and floats on water.

Beauxite is a valuable mineral for the beds of furnaces and for the manufacture of aluminium; the best comes from Beaux, in the South of France; another variety is found near Belfast, and is largely used in the North of England. Cryolite is used as a flux for the beauxite in the manufacture of aluminium. At one time the cryolite itself was used as the source of that metal. Beauxite consists chiefly of alumina and iron, with a little tartaric acid; the white variety contains 21 per cent. of silica. Sometimes beauxite contains enough iron to be regarded as an iron ore. Cryolite, which means "ice stone," is plentiful in Greenland. Its composition is: aluminium, 13; sodium, 32 8; fluorine, 54 2. It is fusible in the flame of a candle, giving off some of its fluorine, which is at once transformed into hydrofluoric acid by the moisture in the air.

Among the mineral curiosities in the collection of Mr. Gregory was some elaterite, otherwise known as "mineral india-rubber," subterranean fungus and elastic bitumen. In the early part of the present century the sole source of supply of this curious mineral was the lead mine of Odin, at Castleton, Derbyshire. At present the mine is unworked, but it is exploited at times by workmen who make arrangements with the owner. Elaterite is said now to be found also at St. Bernard's Well, near Edinburgh; Chapel quarries, Fifeshire; a coal mine at Montrelais; at Neufchatel and on the Island of Zante. The Castleton samples are some of them nearly as soft as size, and the remainder of much the same consistency as india-rubber. They are all black or brownish-black by reflected light, and dark orange red or brown by transmitted light. When a large lump is cut through the center it is often found to be fawn colored in the middle, and it darkens by exposure for a few weeks to the air. It is said to be of a very insoluble nature. Johnston records that when he treated a mass of it with ether but 18 per cent. dissolved; by analysis he discovered it to consist of about 85 per cent. carbon and 12 per cent. of hydrogen, with probably 2 or 3 per cent. of oxygen. Occasionally samples of elaterite are hard and brittle. In the old lead mine of Settling Stones, Northumberland, a mineral rosin somewhat resembling elaterite is found in drops more or less rounded or flattened; these drops incrust the rocky walls of the vein. It is hard, brittle under the hammer, does not melt at 205° C., burns in the flame of a candle, varies from pale yellow to deep red in color and consists of carbon, 85.133; hydrogen, 10.853; ash, 3.256; total, 99 242.

Cæsium is the most electro-positive of all the metals. Its affinity for oxygen is stronger than that of potassium; its basic oxide cæsia is a most powerful caustic, which, when heated, attacks even platinum. Cæsium was one of the exceedingly rare metals discovered by Bunsen and Kirchoff in the early days of spectrum analysis. By boiling down 140 gallons of the water of the Durkheim spring they obtained in the saline residue 1 grain of a salt of cæsium. Ordinary lepidolite contains but traces of cæsium, but a variety found at Hebron, in the United States, yields 0.24 per cent. of the metal. Pisani, however, in 1864, discovered cæsia to the extent of 34 per cent. in a mineral named pollux, obtained from the Island of Elba, in which locality it occurs with petalite. Pollux, of which small specimens are in Mr. Gregory's collection, is colorless, glassy or gum like externally, and fuses with difficulty. It consists, by Pisani's analysis, of 34.07 per cent cæsia, 44.03 silica, 15 97 alumina, 3 88 soda and lithia, 2.40 water, 0.68 lime and 0.68 iron. Pollux colors the blow-pipe flame yellow. It is slowly decomposed by hydrochloric acid, with separation of pulverulent silica.

In the earlier days of his researches on heat Professor Tyndall sought Mr. Gregory for specimens of rock salt adapted to his purposes, and it may here be mentioned in passing that it is a noticeable thing about natural rocksalt crystals that if they have a blue or pinkish hue, and be dissolved in water, all the color disappears in the artificial crystals afterward formed by evaporation. Probably the coloring matter is of an organic nature and is separated by recrystallization. The coloring matter of the quartz crystals known as amythest is supposed by geological chemists to be of organic origin. In a collection of out-of the-way minerals, numbering several hundred specimens, many chemical curiosities besides those mentioned are, of course, included.

New Kind of Brick.—Messrs Bleininge and Hasselmann, two German chemists, have, it is said, recently patented a method for obtaining products that will be more resisting to humidity, &c., than ordinary bricks and tiles. After drying and grinding the clay they make a mixture as follows:

	Parts.
Clay	91½
Iron filings	3
Table salt	2
Potash	1½
Elder or willow wood ashes	2

The whole is heated to a temperature varying from 3362° F to 3632° F. At the end of from four to five hours the argillaceous mixture is run into molds, then rebaked in the ovens—always protected from the air—at a temperature of 842° F. to 932° F. The product may be variously colored by adding to the above 100 parts: 2 parts of manganese for a violet brown, 1 part of manganese for a violet, 1 part of copper ashes for green, 1 part arseniate of cobalt for blue, 2 parts of antimony for yellow, and 1½ parts of arsenic and 1 part oxide of tin for white. These products resist the action of acids, and are well adapted for sewers, &c.

A new kind of tube intended to act as a compression stay in the flues of boilers, besides increasing the heating surface and facilitating circulation, was some time since invented and patented by Mr. Bentley, foreman boiler-maker, of Darlington, England. This tube has some obvious advantages over the ordinary conical tubes, but until lately there was a difficulty in making it. Now, however, this difficulty has been entirely surmounted, and Mr. Bentley has arranged with a leading firm to take up his invention and produce the tubes in any quantity which may be required. They vary in form according to circumstances. For a vertical heating furnace boiler they are either cruciform, having four branches, or may have three branches only. For marine boiler fire-boxes they have three branches, and for locomotive four branches—that is, they consist of one main horizontal tube with two vertical branches. There seems no doubt but that more heating surface and greater strength can be obtained by these tubes than in the ordinary way, and in the case of locomotive fire-boxes, there is no reason why by the use of them the roof stays should not be entirely dispensed with. The tubes are made of the finest soft steel; they are welded up solid throughout, and are tested with water before being sent away.

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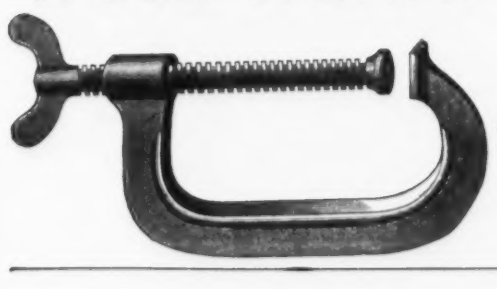

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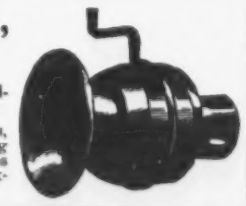

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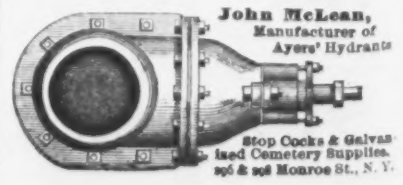

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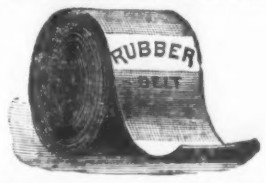

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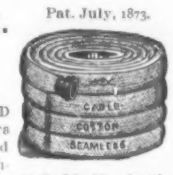

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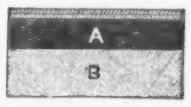

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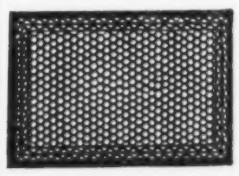

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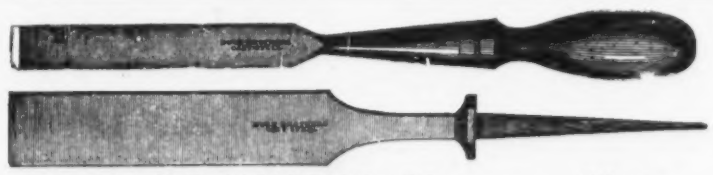

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The Most Complete Assortment in the U. S. of

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CAUTION.—Buyers should be on their guard and not have inferior goods palmed on them by unprincipled persons who represent them as our make. Our tools are stamped "BUCK BROTHERS," and our labels have on our our trade-mark also, "Riverlin Works."

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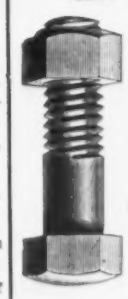
Bearings, Slide Valves, Cylinder Rings, Cross-Head Gibs, Steps, Bushings,

And all purposes where Maximum Durability, Anti-Frictional and Non-Cutting Qualities are Desirable.



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Combine Toughness, Strength, Durability and Resistance to Corrosion.

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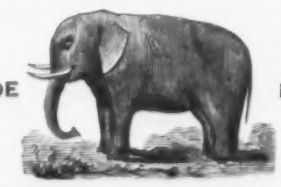

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DROP FORGED

MERRILL BROS., 26 First St., Brooklyn, E. D., N. Y.

English Letter.

(*From Our Regular Correspondent.*)

LONDON, DECEMBER 8, 1885.

THE ELECTIONS

have now progressed so far as to give a certain indication of the final result of the campaign. Out of the 670 members of the House of Commons there are now some 640 elected. Of these about 320 are Liberals, 247 are Conservatives, and 73 Irish Nationalists. The Liberals, therefore, have a goodly majority over the Conservatives, but it is assumed that they will not be able to beat the Conservatives and Parnellites in combination. It is not certain, of course, that any such combination will be attempted, but it is a possibility, as Mr. Parnell supported the Conservatives in the large boroughs, not only to prevent the Liberals from becoming too powerful, but also as a matter of sympathy with the Conservatives. As it stands the general result exactly suits Mr. Parnell's views, inasmuch as, with his compact and obedient phalanx of some 80 to 83 members, he can make or mar the fortunes of either of the great political parties. It follows, therefore, that one of two things must happen, namely, either that Mr. Parnell will bargain with one of the English parties to give his support in return for (Irish) political value received, or, on the other hand, that the English parties will so combine as to nullify the influence of the Irish contingent. The latter of these two alternative courses is most unlikely to be realized, and the probabilities are strongly in favor of the supposition that the Liberals will promptly outbid the Conservatives for the Irish alliance. Already overtures to that effect are said to have been made. What the outcome may be we shall know more about shortly. Now that the Conservatives cannot possibly obtain a majority (although they will probably not resign office until they sustain a direct Parliamentary defeat), the hopes of the fair traders have descended below zero. When the boroughs went for the Conservatives the fair traders were most exultant, and predicted an early and marked victory for their principles. The Liberals, however, capped this with their "three acres and a cow" promise to the newly-enfranchised agricultural laborers, and Hodge, with the miners, has given the Conservatives a very large slice of cold shoulder. It is plain, therefore, that fair trade is not at present likely to become an active political force, especially as Mr. Ecroyd and other of its leading exponents have been defeated at the polls. As a whole the constituencies have rejected fair trade, the only exceptions being Sheffield, Manchester and a few other constituencies. The cry is not dead, and may be much intensified during the hard winter, which will so largely affect the poor generally and the unemployed in particular; but, until the fair traders can produce an intelligible scheme and working tariff, they have "no show" for securing widespread popular favor.

THE IRON MARKET

has been quiet during the week, and is for the most part unchanged in value, but the tone of most of the leading kinds of crude iron is steady, with a tendency toward firmness. At Glasgow the market has been rather irregular, but a considerable turnover has been effected in warrants, which closed at 42/9 ₹ ton. In Scotch makers' brands there are few changes of importance. The recent heavy additions to Connal's stock have brought up the total quantity to an aggregate much above that of any former period. The shipments are on a little better scale, but the imports of Middlesboro' pig into Scotland are also very large. At Middlesboro' the market is steady on the basis of 33/ @ 33/3 for No. 3 foundry, with holders reluctant to sell forward at present rates. Hematite pig iron is firm, under the influence of better employment at the Bessemer works and somewhat considerable orders from the United States. For mixed numbers in usual proportions the current quotations are 44/ @ 45/ ₹ ton. There are now 39 furnaces in blast on the West Coast, as against 49 a year ago, and the present reserve stocks amount to about 99,000 tons, as compared with 64,000 tons this date last year. Shipments from West Cumberland ports this year have been 451,195 tons, a comparative decrease of about 80,000 tons. These smelters are firm in their views, and decline to sell far forward unless at enhanced prices. In the other smelting districts matter are quiet, but fairly steady all round. In heavy manufactured iron there is not much life, especially in the North of England, where many of the mills and forges are idle. English girders and joists, however, are in good and growing request. Fencing wire is quiet and in over-supply, while galvanized sheets are still irregular, although in large production. In ordinary merchant iron we hear of no movements of importance. The current demand is largely for common and lower medium sorts of bars, &c., the higher grades of finished iron being in relatively small request. Welsh bars are £4. 10/ @ £4. 12/6 ₹ ton, less the usual 3 ¢, and other common bars are £4. 17/6 @ £5. 10/ ₹ ton. Sheets are in moderately good request, but few of the mills are fully occupied. For old rails there are American inquiries, but stocks are low in dealers' hands, and the railway companies will not sell, as a rule, at anything like current f.o.b. prices. Heavy wrought scrap iron is firm at 42/ @ 43/ ₹ ton, f.o.b. London, but the rates of freight for United States put shipments in that direction out of the question at present. Freights are steady. Pig iron by ordinary steamers, Glasgow to New York, is very firm at 5/ @ 7/6 ₹ ton. Eastern, &c., rates are as of late. Steel is quiet all round. The Sheffield works are not busy as a rule, the best occupied concerns being those with specialties in forgings, castings and high-class tool steels. The Bessemer works are better off for work, and the Siemens-Martin establishments are well engaged. Austin & Co., London, report a little better demand for old railway leaf-spring steel. Stocks are light, however, and 52/, c.i f. New York, is offered and refused. Steel rails are rather steadier, although prices are unchanged at £4. 15/ @ £4. 17/6 ₹ ton. The 10,000 tons bought by Mr. Vanderbilt from the Barrow Co. are to be made from hammered blooms. The order was sent to Barrow direct, and not through the association, there being no other concern, it is stated, either able or willing to fulfill the conditions of the contract in respect of the hammering. Negotiations are said to be in prospect for the sale of other lots of rails to the United States, but no further bargain has been made as yet. Crop ends have been in strong demand. Most of the producers are well sold ahead, and 52/6 ₹ ton may be regarded as being about the lowest selling price.

SCOTCH PIG IRON

has been fairly steady, mainly owing to the good reports received from the United States, the rather better shipments and the hopes of an improved condition of trade. There are now 92 furnaces in blast in Scotland, as against 93 a year ago. In Connal's stores there are 651,499 tons (an addition of 4575 tons last week), compared with 579,789 tons this date last year. The shipments are 86,480 tons behind, while imports from Middlesboro' are 95,026 tons ahead. Current quotations:

Deliverable alongside.	No. 1	No. 3
Gartsherrie, at Glasgow	46/	43/6
Coltness, "	50/6	45/6
Langloan, "	47/6	45/
Summerlee, "	50/	44/
Calder, "	51/6	43/6
Carnbroe, "	45/6	42/
Clyde, "	46/	42/
Monkland, "	43/3	41/
Quarter, "	42/9	40/6
Govan, at Broomielaw	43/3	41/
Shotts, at Leith	47/	46/6
Carron, at Grangemouth	51/	47/
Kinneil, at Bo'ness	43/6	43/
Glengarnock, at Ardrossan	46/	43/
Eglinton, "	43/	40/
Dalmellington, "	44/	40/

I am asked to intimate to your readers that John E. Swan & Bros., Limited, iron merchants, of Glasgow and Middlesboro', England, have been appointed the exclusive agents for the sale of the Carron brand of Scotch pig throughout the United States. Messrs. Swan, I need scarcely say, are well-known members of the Scotch iron trade. Carron Furnaces were built in 1759, and this company were the first makers of foundry pig iron in Scotland. The original Blackband iron-stone is used in their works, producing a fluid, soft quality of iron, eminently suited for all descriptions of fine castings, samples of which may be had on application and can be seen at the office of Messrs. Henderson Brothers, 7 Bowling Green, New York.

MIDDLESBORO' PIG IRON

is fairly steady, and the outlook is considered moderately good, in view of the expected further restriction of production. G.M.B., f.o.b. at makers' wharves in the Tees, net cash, less 2½ on 10th of following month, are quoted:

No 1 Foundry	35/	Mottled	31/
" 2 "	34/	White	30/6
" 3 "	32/6	Refined metal	50/
" 4 "	32/	Kentledge	35/6
" 4 Forge	31/6	Cinder	30/

WEST COAST HEMATITES

are firm, and more money is being asked in some cases for long future deliveries. Mixed lots in usual proportions are 44/6 @ 45/, and special brands as below:

	No. 1	No. 2.	No. 3.
Cleator	45/6	45/3	45/
Lonsdale	45/6	45/	44/6
West Cumberland	45/6	45/	44/6
Lowther	45/6	45/	44/6
Distington	45/	44/6	44/
Harrington	45/6	45/	44/6
Solway	45/	44/6	44/
Maryport	45/6	45/	44/6

TIN PLATES.

In London business has been done as low as 14/ for IC cokes, but this must be considered as exceptional, and it is not easy to place orders at but a trifle below 14/6. In fact, the majority of the makers are not pressing to book new business; there does not seem to have been many orders since my last. I quote IC cokes 14/3 @ 15/, and steel cokes, which are in fair demand, 14/6 @ 15/, f.o.b. Liverpool. At Liverpool things generally may be said to be quieter, and prices for some sorts of tin plates are easier. There is no fear that prices will drop to any appreciable extent, and it will not be necessary for makers to recede from their present position if other sellers will but refrain from pressing plates on the market. The demand this week has run pretty much on steel plates with coke finish, there being as many inquiries for Siemens quality as for Bessemers. There were also a few orders for coke tins placed, and, generally speaking, at last week's figures, the attempt to get beyond there having failed. There has been a fair inquiry for charcoal tins, and an improved demand for ternes at 14/6 @ 15/ IC for the latter. Coke tin wasters as well as steels are in good demand at 13/6 @ 14/. Bessemer steels are still quoted 14/6 @ 15/ IC, and Siemens steels 15/ @ 15/6; charcoal tin plates are 16/ @ 18/ IC, in accordance with specifications. Several good orders have been placed this week. The inquiries for ternes may be said to be still on the increase.

THE HARDWARE TRADE.

At Birmingham business appears to have returned to its ordinary channels, and orders, which have been interrupted for some time past, come in more regularly. There is still ample room for improvement, however, as the shipping trade is now at its minimum, and home orders, though fairly numerous, are still of a hand-to-mouth character, and in some branches adversely affected by the weather. There has been rather more demand lately on account of the United States, and some of the South American markets are reported once again fairly active, but on the whole our shipping trade is rather quiet. At Wolverhampton orders in the japanning trades are very small, though firms who are more of a middle and third rate style do not complain much of the demand. Sales of German enameled hollow-wares continue, but while this would seem at the moment to be disadvantageous there are firms in the trade who are bold enough to question whether it is an unmixed evil. They believe that it should result in manufacturers and workmen alike becoming so thoroughly alive to the reality of the competition that they will each recognize the necessity of making an earnest effort to meet the new tastes and wants of the home buyers. At Sheffield the best part of the season has, however, been more or less seriously dam-

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BUFFALO CUPOLA & FORGE BLOWERS

All Sizes and Styles, for Every Possible Duty.

The Most Positive, Durable and Economical Made, and

GUARANTEED TO GIVE PERFECT SATISFACTION

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BUFFALO, N. Y.

PENFIELD BLOCK COMPANY.

LOCKPORT, - - N. Y.

ANCHOR BRAND

TACKLE BLOCKS * and TRUCKS

*** BRONZE MEDALS at CHICAGO EXPOSITION. ***

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L. M. RUMSEY MFG. CO., *St. Louis.*

FOX SAD-IRON CO.,

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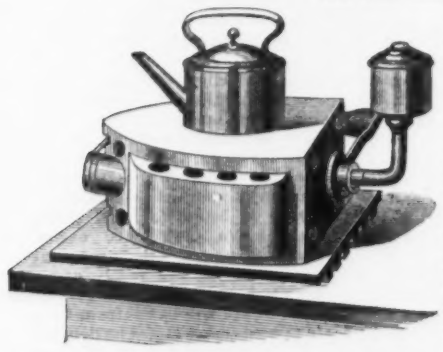
NEW YORK.

Awarded the only *Gold Medal* at the *New Orleans Exposition* over all Sad Iron competitors.



Our Iron does away with Hot Kitchens.

Being reversible, one Iron does the work of an entire set (one side heats while the other is in use). It combines first-class Fluter and Polisher, also makes the best little Cooking Stove for a sick-room, &c., ever invented. Can be used with either Gas or Alcohol. Very simple and absolutely safe in handling.

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NEW STYLES HANDY **TOOL CHESTS,** and GENTLEMEN'S with Drawer,

AND FITTED UP WITH A GOOD QUALITY OF USEFUL TOOLS.

We desire to call the attention of the Hardware and House Furnishing Goods Trades to these two new styles of Chests, being different from any we have yet offered in the market. Catalogue, with prices, of these new goods is now ready, and will be furnished to the Trade on application, as well as our Regular Catalogue, with prices, of Gothic, Eureka and other styles of Tool Chests for the season of 1885.

PRIZE MEDALLISTS.

Exhibitions of 1862, 1865, 1867, 1872, 1873, and only Award and Medal for Noiseless Steel Shutters at Philadelphia 1876, Paris, 1878, and Melbourne, 1881.

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Original Inventors and Sole Patentees of

NOISELESS, SELF-COILING, REVOLVING STEEL SHUTTERS,

Fire and Burglar Proof. Also Improved ROLLING WOOD SHUTTERS of various kinds, and Patent METALLIC VENETIAN BLINDS

Office and Manufactory, 162, & 164 West 27th St., New York.

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PEQUOT FOUNDRY & MACHINE WORKS,

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Fine Iron Foundry and Machine Work.

Acquaintance With New Work is Solicited.

The plant of our works embraces complete equipment for Iron Foundry, Machine Shop, Polishing, Bronzing, Japanning, Coppering, Lacquering, Brass Electro-Plating on Iron, and Pattern Designing and Building in Wood and Metal. Brass and Iron.

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Manufacture Safety and Guard Harness Snaps Snap-Links for chain adjusting and repairing, Rope Goods for horses and cattle, Breast Chains with sleeve snaps, &c., &c.

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Mather's Patent Saw Swage.

SUPERIOR TO ALL OTHERS.

If your Hardware Merchant does not keep it, send $2.50 to the manufacturer, who will forward it by mail. Liberal Discount to the Trade. Send for Circular.

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"EASY" LAWN MOWER.

The only practical

Forward-Cut Roller Mower

ever on the market, combining Durability with extreme Light Weight.

Style of Medium-Size "Easy."

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Manufacturers of

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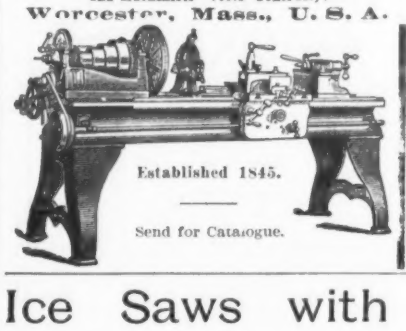

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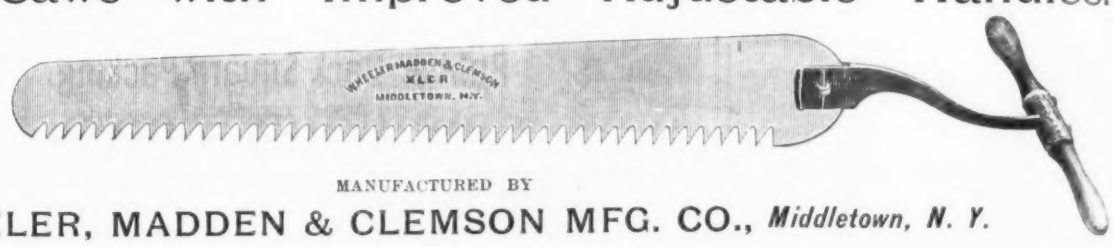
Ice Saws with Improved Adjustable Handles.



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These Saws are best quality, well finished and handsomely etched. Handles are easily removed and adjustable to different positions. We have large stock ahead, and can fill orders promptly.

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NAILS and **Bar Iron** of Superior Finish, made exclusively from Pig Iron.

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New Improved PATENT *Malleable Iron* OILERS.

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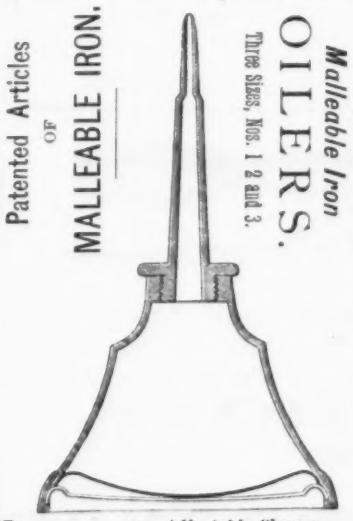

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New Pattern Heavy Screw Clamps. *Strongest in the market.*

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MALLEABLE IRON CASTINGS of superior quality, and Hardware Specialties in Malleable Iron, made to order.

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RED WARRIOR **AXES,**

BROAD AXES,

Adzes, Broad Hatchets, Spanish Axes and Tools.

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A New Ash Sifter.

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The T. H. Bullock BELLOWS The Best for the Money. Cleveland, Ohio. **FORGES**

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Post Hole Diggers

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complete

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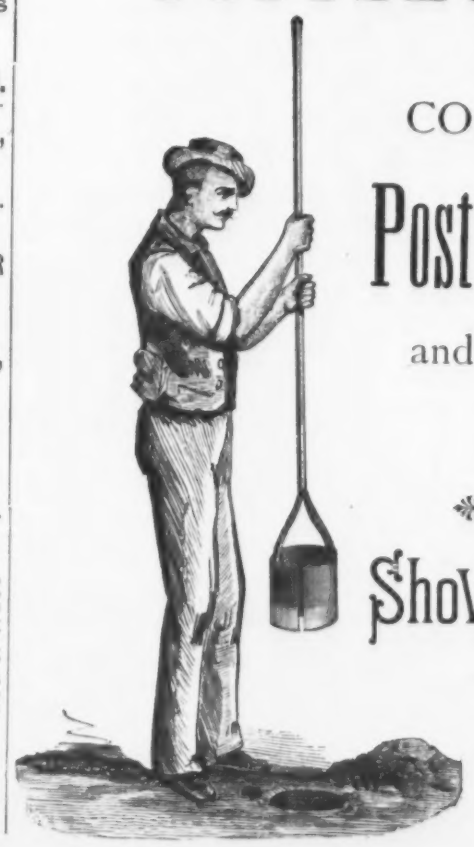

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IMPROVED UNDER PATENTS OF 1875 AND 1876.

Safety, Economy in Fuel, Low Cost of Maintenance, Dry Steam without Superheating, Large Reserve Power,

ARE THE ADVANTAGES OFFERED BY THIS BOILER IN A PRE-EMINENT DEGREE.

3000 Horse-Power in Progress and for Immediate Delivery. Correspondence Solicited.

EDGE MOOR IRON COMPANY,

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Mount Carmel Ox Shoes,

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The Best and Cheapest Shoes Made.

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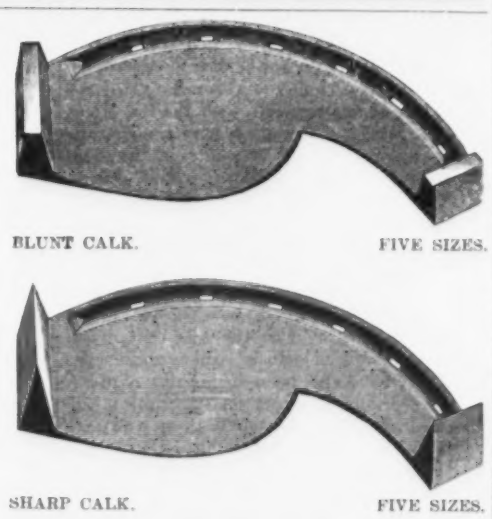
Miller's Pat. Forged Ox Shoes.

CORRESPONDENCE SOLICITED.



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Made in Four Sizes: 10, 12, 14 and 16 inch cut. Most reliable Mower in use. Easy to work, strong and durable.

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Samuel Martin,

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OSBORN M'F'G. CO. 79 TRADE MARK 79 BLEECKER ST. NEW YORK.

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Bright Metal Cages, in Brass, Bronze and Silver Plate.

NEW AND BEAUTIFUL DESIGNS JUST OUT.

We also Manufacture Brass and Bronze Show Stands for Fancy Goods. *Catalogues Mailed Free.*

aged by the political disturbance, and the bare three weeks before Christmas can do little to compensate for the disturbance which has been caused in the trade in light finished goods. The electro-plate firms are now pretty fairly employed on home orders. American and Colonial orders exhibit no change, though the reports of the Cape market are somewhat conflicting.

THE BOARD OF TRADE RETURNS

for November, issued to-day, are not very cheering They show that the imports were of the value of £29,883,768, against £30,752,453 in November, 1884. The exports were worth £16,464,250, as against £17,704,213 in the same month of last year. The iron and steel exports were of the value of £1,662,338, as compared with £1,937,789 in November last year.

TO THE UNITED STATES

the chief lines were as under:

Articles.	Month of Nov., 1885.	Month of Nov., 1884.	Month of Oct., 1885.
Alkali, cwt.	333,199	236,200	306,730
Hardware and cutlery, £	24,464	20,601	24,753
Iron—Pig, tons	10,804	10 374	8,601
Bar, angle, rod, &c., tons.	275	193	112
Railroad, all, tons.	37	1,007	130
Hoops, sheets, plates, &c., tons.	1,410	2,315	2,849
Tin plates, tons	18,417	16,861	17,533
Cast or wrought, tons	259	74	53
Old, tons	1,945	1,040	1,422
Steel, unwrought, tons	2,154	1,049	1,636
Lead, all sorts, tons	52	50	1
Steam engines, £	4,713	3,607	3,405
Other machinery, &c., £	23,346	27,880	36,177
Tin, unwrought, cwt.	266	200	684
Special return—Iron rails, tons.			
Steel rails, tons	35	1,007	130

American Wire Mills.*

BY JULES FRESON.

(Concluded from page 33, December 17.

Oliver & Roberts, of Pittsburgh, fire their reheating pots with Murraysville natural gas, the regularity of the temperature carrying up their life to 9 or 14 months. At the same works there is an arrangement for handling the pots by means of a lifting apparatus. The pots are annular, with a circular rim. Attached to the upper part of the central tube are two lugs placed diametrically opposite one another. The lifting apparatus is lowered into the tube and is turned so as to catch under these lugs. At the same time it seizes the outer rim, so that the reheated wire may be withdrawn. The wire is coiled in rolls within the pots, which are filled with sand. The sand completely covers the metal and preserves it against oxidation. The pots are exactly piled one above the other in cast-iron holes heated from the outside, there being a free space of about 5 inches between the pots and the walls of the hole. Thus the air confined in the holes may concentrate and equalize the temperature. It rises in the annular space, where it is heated most, and descends along the vertical tube formed by placing the pots one above another. These movable pots carry about 1500 pounds of wire, and may be heated in less than one hour. The majority of the wire works have special furnaces, in which the wire is reheated by direct contact with the reddish-brown flame. They are long reverberatories, in which the bundles are placed on rails. They remain in them until they are cooled. The reheating thus carried out depends completely upon the manner in which the firing is conducted. It is less uniform and less efficacious than the reheating in closed pots, and is employed only when the number of the latter is not sufficient.

Pickling follows reheating. Dry pickling is not practiced in America, although the by-products of wet pickling are not recovered in the wire mills. Dilute and heated sulphuric acid is generally used. The operation is almost universally carried out in red-pine vats without lead lining. In large plants the series of acid, water and lime vats are arranged on the circumference of a circle, the center of which is occupied by a steam crane. When coming out of the acid the bundles of wire are beaten either by hand or mechanically, and washed with water. Unless the wire is to be drawn dry, it is dipped into limewater or flour paste, and finally dried in large muffles, under which the flame passes first and through which it then goes.

The acid is usually brought into the works in special cars from which it is directly forced by compressed air into tanks located at a higher level than the pickling vats. It is true that in this manner the costs of transportation and of labor are reduced to a minimum, but it seems that this arrangement increases the consumption of acid.

When the bundles of wire are placed one by one into the pickling vats those put into them first naturally come out of them last, and, having been exposed too long to the action of the acid, they may become hard. With the object of withdrawing all the wire at once when the acid has acted sufficiently, the operations are sometimes carried out in the following manner: Six or eight bundles are placed above one another around a cylindrical body of wood, the lower part of which is arranged to receive four brackets intended to carry the weight of the wire. The wooden cylinder is attached to the hoisting apparatus, so that the wire is easily plunged into and withdrawn from the bath. The brackets, when the wire has been taken out, are relieved from pressure by throwing the bundles on another support; they are then easily drawn out, the wooden cylinder raised and the bundles stand alone, stripped from the latter.

The pickling water is often allowed to run to waste without even neutralizing it. In the East, however, the beginning of recovering the copperas has been made. With this object in view the liquor undergoes systematic concentration. There is a series of cast iron pans placed one above the other. Under the lowest is a fireplace from which the flame passes in succession under each of the other pans. The pickling water enters the top pan first and goes through the series in a direction opposite to that of the flame. When finally the needed degree of concentration has been reached, the liquor goes to crystallizing tanks.

The galvanizing plants are arranged on a large scale in America. The bath of zinc is traversed by 12 to 20 wires at a time, traveling side by side, drawn by the uniform motion of drums driven by an engine. On account of the large quantities treated and the high speed it happens that tangling occurs, which gives rise to difficulties. A special arrangement has accordingly been devised to give the workman time to disentangle the wires before they break or injure any part of the mechanism, without stopping the operation. With this object in view a certain amount of slack is allowed between the unwinding reel and the bath of zinc, tension being given to it by the following method: The wire is passed over a grooved pulley which is capable of moving upward and downward in vertical guides. A counterweight tends constantly to carry it toward the highest point. There is a pulley and a special counterweight for each wire, the whole being so arranged that it is in full view of the workman. When as a result of entangling the wire ceases to run regularly, the slack begins to give. The descent of the pulley and the ascent of the counterweight attracts the attention of the workman, who hastens to right the trouble. As soon as the wire is straightened out the unwinding reel revolves rapidly under the action of the counterweight and unwinds the necessary slack to allow the pulley to rise again to its usual hight, about 30 feet or more above the bath. This arrangement affords time to put on a fresh bundle of wire without stopping, and to attach the end of the last one to the beginning of the next. It allows of galvanizing at a great speed, and to increase production.

In order to galvanize iron or steel wire it is necessary to make it pass first through a bath of hydochloric acid. In America this bottom of the bath is often covered with gravel, and drums force the wire to pass through it, so that it is cleaned both mechanically and chemically. The wire is then dried and heated to the temperature of the bath of zinc, which is done by making the wire pass through tubes running through the upper part of a small special furnace.

The zinc into which the wire is immersed is contained in ½-inch to ¾-inch sheet-iron tanks, the rivets of which are protected against the action of the fire. The mild heat to which they are exposed assures a life of a year at least.

The wire is stripped of an excess of zinc by passing through material which allows it to retain only a thin and uniform covering. The most suitable materials are asbestos or slag wool. They are usually held by a simple apparatus, which is opened to introduce the wire, and which closes through the action of a weight or a spring. Sometimes, too, a more complicated box is employed, which does away entirely with handwork. This box, which must be at least 2 feet long, is placed at the end of the bath, so that the excess of zinc drops back into the latter. The bottom is a few inches above the surface of the zinc, and has the opening into which the wire enters. This opening must be large enough to permit of the passage of the knots which connect succeeding bundles. The speed of the work makes these knots necessary. They must be seriously considered in the combination of the mechanism for stripping. In fact, they make it necessary to proscribe any rigid piece coming into contact with the wire. In the stripping-box there are rollers provided with teeth, which are made to rotate with the object of forcing the zinc stripped off in a direction contrary to that of the moving wire. There are, besides, arms having a reciprocating movement connected with eccentrics through the intermediary of springs. These assure a good distribution of the material in the box when, for some reason or other, it has become too dense. They push it against the wire and bring it within reach of the teeth of the rollers. This system strips the wire perfectly and reduces the consumption of zinc to a minimum. The drums on which it is wound are so arranged that the wire can be taken off readily. In order to hasten the cooling of the wire a current of cold air is constantly directed against every drum.

At Worcester there are four zinc tanks with 20 wires each. The plant has some special features. The wire passes from the unwinding reel into hollow brick in a furnace heated by grates and carrying a tubular boiler to utilize the waste heat. Then the wire plunges red hot into a bath of hydrochloric acid, in which it is kept down by a granite wheel. It dries itself through the heat it has retained, enters into the bath of zinc and finally goes into a mixture of sand and charcoal dust. The galvanizing tank is heated by four small grates placed at each of the long sides, and fired with bituminous coal.

The new plant at Trenton is a model one. There are four 16-wire tanks. The wire first enters a tank of hydrochloric acid having a maximum depth of 8 inches. It has double wooden walls, with a layer of pitch between them to make it tight. Then the wire goes through a cast iron drying apparatus, and enters the galvanizing bath directly. The latter is made of ½-inch plate, with outside rivets. It is 9 feet long, 30 inches wide, and 21 inches deep. It is heated by two grates, 52 x 16 inches, located at the point where the wire leaves the bath. The flame goes along the two sides of the tank and reaches the chimney after passing through the dryer. The 16 wires are stripped of their excess of zinc in sand, pass over a drum having 16 grooves, placed 10 feet above the bath, and from it are distributed to 16 reels arranged to take off the wire easily. They are arranged in two rows, and are driven by a small engine. In order to distribute the wire well over the reels the wire is seized by a guide which is given a forward and backward movement by an eccentric.

* *Revue Universelle des Mines.*

A would-be financier advocates copper coinage and the issue of copper certificates, on the ground that vaults for the storage of the metal would be less expensive, being less inviting to burglars than deposits of silver; moreover, it would give the copper owners a chance.

The Iron Age

AND

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American Shipping.

The resuscitation of our mercantile marine is among the questions that deeply concern legislators at Washington. To them our Chambers of Commerce and Boards of Trade anxiously appeal in their attempts to revitalize an interest that lies near to the sources of our national prosperity. Recent legislative enactments designed to relieve our shipping from the burdens of taxation have, it is true, accomplished something, but as yet American shipyards are vacant and American shipmasters do not contest for the supremacy of the seas. The decadence of our ocean marine is more manifest year by year. In a report just published by the chief of the National Bureau of Statistics it is stated that the value of our foreign trade during the last fiscal year was $1,388,000,000, of which only 14.6 per cent. was carried in American bottoms and only 7 per cent. in American steam vessels. The "free ship" men—those who demand that foreign bottoms shall be admitted to the privileges (?) of the American flag—persist in looking to English builders for "cheap ships," in the belief that vessels purchased abroad on favorable terms can be sailed at a profit, and thus obtain a place, if not absolute control, in ocean transportation between the United States and foreign ports. We are prepared to demonstrate that the argument thus presented is illusory and wholly irrelevant, only serving to divide and disconcert those who intelligently endeavor to promote the maritime interests of the country. Arrayed against the "free ship" advocates we have the significant fact that England herself is suffering as we suffer, to a large extent from similar causes, and in a form aggravated in a ratio corresponding with the magnitude of her enormous fleets of shipping. In truth, her predicament is most serious. In the London *Statist* received by the last mail we read that shipbuilders on the Mersey, Tyne and Wear are suffering perhaps as never before, and see no tokens of coming relief. In Sunderland alone there are 12,000 unemployed mechanics from the silent shipyards, and this in a town where there have been large investments by all classes of people in ship property now yielding no returns. In addition to all this, the British shipbuilding industry is threatened with a new peril—the competition of Englishmen who carry on their business in foreign ports, where wages are extremely low and taxes are light. "A short time ago," says the *Statist*, "eleven ships might have been seen in process of construction in one yard at Bergen, a Norwegian port. That yard is owned by a Sunderland man, who, although he has to import iron from England, can yet build a ship for less than he could build it for on his native river. Riveters are paid 25/ a week in Bergen, as against £3 or £4 a week in this country. That is the main reason why Norwegian yards are busy while those of Sunderland are silent."

But the first cost of ships, which some gentlemen seem to regard as a controlling factor, we can afford to eliminate wholly from the discussion, the real question being how to sail them profitably. The rapid rise of Norwegian shipping is a new factor in the equation. In the season of navigation just closed at Quebec 239 ships from Norway and Sweden arrived at that port, against 306 English—the increase of the former as compared with 1884 being 38, while in British tonnage for the same time there was a loss of 11 ships. At all the lumber ports in Canada Norwegians are steadily gaining on the British, and it is suggested that if Norwegian vessels were adapted to "all round the world" voyages they would make matters very uncomfortable for their competitors. The inevitable deduction from these facts is that, if British builders can scarcely hold their ground against seamen who subsist on stock-fish, Americans will still hesitate to embark their capital except under more favorable auspices.

Confronted by difficulties on every side, it is not surprising that American merchants and vessel-owners are sharply divided in regard to the feasibility of measures devised for the encouragement of American shipping. It is to be observed, however, that a degree of unity is manifested at the present time before unknown—many of those who formerly opposed all forms of aid from the Government Treasury having changed their ground, notably such stiff free traders as Capt. Ambrose Snow, well-known in all nautical circles; and Jarvis Patten, Commissioner of Navigation, in his annual report, just completed, occupies substantially the same ground when he commends the bounty system adopted by France to "encourage iron shipbuilders." The bill most generally agreed upon is as follows:

An Act for the Relief of the Merchant Marine of the United States Engaged in the Foreign Trade.

Be it enacted, &c., That on and after the passage of this act there shall be paid, out of moneys in the Treasury of the United States, not otherwise appropriated, to any vessel, whether sail or steam, built and owned wholly in the United States, engaged in the foreign trade, the sum of 30 cents per registered ton for each 1000 miles sailed, and pro rata for any distance traveled less than 1000 miles on any voyage or voyages between this and any foreign country or countries, and the measure of distance traveled, and the distance between ports or places in this country and ports or places in foreign countries, and between one foreign port or place and another foreign port or place, and from any designated point of longitude and latitude to any port or place in this country or any foreign country, shall be determined by measurements which shall be furnished by the United States Hydrographic Office to the Bureau of Navigation, and such payments to any vessel as aforesaid shall be paid on the vessel's arrival at a port of entry in the United States, in accordance with such regulations as the Secretary of the Treasury shall prepare and promulgate. The payment at the rate of 30 cents per ton for each 1000 miles sailed, as herein provided to be paid to vessels engaged in the foreign trade, shall continue for the term of 10 years, and thereafter for another term of nine years at a reduction of 3 cents per ton each year upon each 1000 miles sailed and pro rata for any less distance traveled.

This measure contemplates heroic treatment, too radical to meet general acceptance, and in spirit widely at variance with long-established maxims of public policy. Western Members of Congress, oblivious to the enormous grants of land and Credit Mobilier operations heretofore approved by the Government in aid of mammoth railroad corporations and projects of internal improvement, will doubtless oppose a drain on the Treasury in behalf of ocean commerce in which they have only an indirect interest. Nevertheless, the fact remains that since the fostering care of the Government was withdrawn prior to the Rebellion our maritime tonnage has steadily declined. As argued by Wm. H. Webb, the distinguished shipbuilder who put afloat the ironclad Dunderburg, the mammoth steamer City of Bristol, and many others, "something more than a bounty on the building of the ship is necessary. * * * for the great difficulty in resuscitating our ocean commerce is not the first cost of the ships, but the continuous greater expense of maintaining them in service than is demanded from their foreign competitors."

Among other remedies prescribed is the establishment of marine postal routes, limiting the cost of such service to a maximum rate per nautical mile; remitting import duties on materials actually used in shipbuilding; restricting the individual liability of owners and granting relief from personal tax; and, so far as practicable, removing all other taxes and consular charges. Moreover, it is said, let our Government grant contracts to private shipbuilders on such conditions as to warrant liberal expenditure in the construction and maintenance of tools and machinery. Much has been accomplished by State laws, but the Dingley Shipping act proves wholly inadequate, and it remains for our national representatives at Washington to solve this great enigma of American shipbuilding, unless it shall be found that the country is better off without a merchant marine than with it.

Mr. Manning and Average Ad Valorem Duties.

Last week we referred briefly to the views expressed upon the tariff by the Secretary of the Treasury. It is evident that Mr. Manning has fallen into the hands of gentlemen whose arguments are those of a generation ago, and who seem to have learned nothing during the past quarter of a century. With the utmost disregard of facts and of the information that has come to the knowledge of the world in 25 years, he proceeds with the most charming *naiveté* to make statements that have long ago been exploded, and as though they were discoveries of his own. We do not purpose at this time to take up all of the fallacies of the Secretary regarding the tariff. There is one, however, to which we wish to refer. Speaking of rates of duty, he says: "They have been retained at an average ad valorem rate for the last year of over 46 per cent., which is but 2½ per cent. less than the highest rate of the war period, and is nearly 4 per cent. more than the rate before the last revision." This statement and the context lead one to infer that the Secretary regards this as a most remarkable fact, and as evidencing beyond all doubt the necessity of an immediate and marked reduction of the tariff. There is no greater absurdity or fallacy in connection with the tariff laws than this assumption that what are called "high average ad valorem rates" always indicate a necessity for a reduction in the tariff. They simply indicate what everybody who understands the commonest principles of arithmetic knows to be a fact—that specific duties when prices are low are a larger percentage of those prices than they are when prices are high. A specific duty of $17 a ton on steel rails when the import valuation of these is $22 is a vastly different thing from what it is when the imported value is $40. If it is a good argument that when specific duties converted into ad valorem duties show high ad valorem rates, therefore there should be a reduction in the duties, it is an equally good one that when these specific duties converted into ad valorem duties show low ad valorems rates there should be an increase in duties. To show the absurdity of this position in each case it is only necessary to refer to the fact that these high ad valorem rates show low prices ruling, while the low ad valorem percentages show high prices ruling, and, if duty is to be levied, instead of the industries of the country being able to endure reductions at times of low prices they should bear an increase of duty, and *vice versa* as to high prices. In other words, if any rule of action is to be deduced from the fact of high ad valorem percentages on low-priced goods it is just the opposite of what the Secretary would have us believe it should be.

The fact that the average ad valorem rate of the last year is only 2½ per cent. less than the highest rate of the war period is remarkable, but not in the sense that the Secretary means. It certainly is astonishing that the average ad valorem rate with the low prices ruling in 1884 should be so near the average ad valorem rate at the time of the high prices of the war, and, if this is true, and we do not question it, it shows that the reduction in duties since the high period of the war has been much greater than is commonly supposed. The only way possible by which the average ad valorem rate at the present time could be so near the average ad valorem rates of war times is that, while prices have been reduced so materially, rates of duty have also been materially reduced. The Secretary's report on this subject will not at all commend itself to those who have given the matter something more than a theoretical investigation. Those who have gone out of their studies and examined into this subject in the light of facts, and not of preconceived theories, will at once see the fallacy of many of the Secretary's positions, and, as we remarked last week, if the Secretary proposes to base a tariff on the views he has enunciated in his report, it would be be a good plan for him to erect a lightning-rod in his neighborhood.

Boilers of the "porcupine" class, as they are familiarly termed, and of which the Hazelton boiler—fully described in an earlier issue—is a good example, have of late attracted increased attention, especially abroad, where the importance of practicing small economies is more generally recognized than in this country. In France this particular type of boiler has been introduced under the name of the Hervier boiler, to which we referred in our columns about two years ago, and from all available accounts it would seem that the results of its use have been of the most satisfactory character. This is not at all surprising, as earlier trials with other boilers embodying the same principle, such as the already mentioned Hazelton generator, have conclusively demonstrated the capabilities of the system. Successful utilization of waste heat is among the principal claims made by the builders of such boilers, and is fully sustained by figures obtained in practice. Ease of repairs, cleaning and inspection, freedom from many of the evils of expansion and contraction of the tubes, and numerous other valuable features, are quoted in their behalf, amply sufficient to secure for them favor among those in want of simple and efficient steam generators. In some iron works especially the field for this class of boiler appears unusually large, the heat wasted owing to imperfect appliances for its utilization representing an an item of considerable importance.

The Coal Miners' Convention.

What at one time promised to be a most important convention has recently been held in Pittsburgh. It was attended by representative coal miners and operators from various sections of the West, though the convention was by no means as representative, especially on the operators' side, as it was expected it would be. This convention was the result of a conference held in Chicago some weeks since, and was called to discuss means for the avoidance of the constant difficulties as to wages that seem to have become almost a necessary feature of coal mining. While, as indicated, it was by no means as thoroughly representative a body as it was hoped would congregate, it brought together a larger number of miners and coal operators and representatives of more districts than had ever convened before in the country.

The convention resulted in the thorough discussion of methods for fixing rates for mining and for avoiding difficulties, but at the same time developed a considerable diversity of opinion, as was to be expected in view of the composition of the body. The outcome of the convention was the adoption of a scale of wages for the various bituminous coal districts as follows:

	Cents per ton.
Pittsburgh.....2¾ cents per bushel, or	71
Hocking Valley	60
Indiana, block	80
Indiana, bituminous 1	65
Indiana, bituminous 2	75
Wilmington, Ill.	95
Streator	80
Grape Creek	75
Mt. Olive	56⅓
Staunton	56⅓
Springfield	62½
Des Moines, Iowa	90
At West Virginia, the Kanawha district, reduced prices to be restored to	75
Reynoldsville, Fairmount, Pa., screen coal	71

These pricees to rule from May, 1886, to May, 1887.

The scale was referred for approval or disapproval to the operators and miners of the several districts, and an adjournment was had to February 23, 1886, at Columbus, Ohio. Both the operators and miners met after the convention had adjourned, and made arrangements to secure a more thorough representation at the meeting to be held at Columbus. The coal operators passed the following resolution and also appointed a committee to call a convention of operators in each State to elect delegates to this convention:

Resolved, That it is the sense of the operators assembled that it is wise that a State convention of operators be called in each State, to take such action as they may see fit; and to send delegates from such State to represent them in the joint convention to be held at Columbus, February 23, 1886, and that such delegate or delagates be clothed with full authority to act in the interests of all the operators of such State. We would say that we have the assurance of the representative miners who were associated with us in this matter that they will guarantee that any action agreed upon at the convention at Columbus on the 23d day of February, 1886 will be faithfully carried out by the miners, and that they will pledge their faith to the same.

The miners also provided for a national convention of the miners' representatives, to be held in Columbus on the 25th of February, two days after the adjourned meeting of miners and operators.

It is difficult to see what will be the outcome of this movement. It should surely be possible to prevent the constant strikes and lockouts which disgrace this industry, but this cannot be done without a most thorough organization of both operators and miners and a complete and frank understanding between them. As to the wisdom of a scale of prices for the year, we are somewhat in doubt. If manufacturing continues as depressed as it has been there will be no such increase in prices as to justify any increase in wages, but should the improvement which in many quarters is so confidently expected come in 1886 we doubt if the scale of prices based on the present condition of affairs could be maintained, or, if it could, that it would be wise to maintain it. We also very much doubt that a scale of prices made up by representatives from all districts, even though it may receive a majority vote in the convention, can be maintained. The members of the convention are human and have all the human frailties. The chief aim of any producer is to decrease his cost of production while he increases that of his neighbors, and it is possible that the arrangements of districts is such that a majority vote can be got for a given scale of prices because one or more districts may be competitors of all the others, and if the prices in those districts are high enough to suit the other districts with which their coal comes in competition a majority vote could be secured for such a scale. We are in doubt as to whether a national convention can agree upon a scale for all districts unless each district by its miners and operators is permitted to arrange its own price and all of these to receive the sanction of the convention.

Our Australian Trade.

In spite of the rapidity with which production and general prosperity have of late years been developing in Australia and New Zealand, our domestic exports thither have diminished in value, partly because the markets there were momentarily overdone with what we ship, and partly because of lower prices. Our imports, on the other hand, show some increase, because under the latest tariff revision relating to wool our manufacturers have consumed certain qualities of the latter not imported before. Direct tin importation from Australia has not amounted to much so far, since it would not pay to receive it per steamer via San Francisco, and the sailing vessel opportunities this way are not frequent enough to make it a regular business. Our imports and domestic exports are shown in the following table:

Fiscal year.	Imports.	Domestic exports.
1883.....	$9,638,997	$4,021,356
1884.....	9,225,459	4,373,405
1885.....	10,534,138	2,822,393

On comparing the total trade of Australasia in 1883 with what it was in 1876 it will be found that the imports have increased very much; the exports less so. This great excess of imports over exports which has characterized late years in the foreign trade movement and the commercial relations with the mother country has been due in a great measure to the railroad and telegraph extensions, necessitating an enormous importation of material paid for by loans in London. The years mentioned compare as follows:

	1876.	1883.
Imports.....	£45,495,682	£61,470,923
Exports.....	43,102,620	45,589,757

In 1881 the total imports were £52,709,000, and the total exports £48,369,000, about half of which was to and from England, and in 1882 the total imports were £63,844,000, and the total exports £50,633,000, England again holding the same position. The specie exports in 1881 amounted to £9,128,000, and in 1882 to £7,743,000. Wool exportation rose from 19,637,000 pounds in 1881 to 21,224,000 in 1882. In the same year the number of vessels entered and sailed amounted to 17,534, with a joint tonnage of 10,866,855.

The wheat production of these colonies in 1884 was as under:

	Population.	Under culture generally, acres.	Seeded with wheat, acres.	Wheat yield, bushels.
Victoria.....	932,000	2,216,000	1,104,000	15,570,000
N. S. Wales..	869,000	734,000	247,000	4,042,000
Queensland..	287,000	167,000	10,000	43,000
S. Australia.	305,000	2,755,000	1,846,000	14,649,000
W. Australia	32,000	61,000	29,000	874,000
Tasmania....	126,000	394,000	41,000	733,000
New Zealand	541,000	1,412,000	378,000	9,827,000
Total.....	3,092,000	7,739,000	3,655,000	45,238,000

The total live stock is shown in the following table:

	Sheep.		Cattle.	
	1876.	1883.	1876.	1883.
New S. Wales	24,503,000	31,796,000	3,131,000	1,641,000
Victoria.....	11,279,000	10,739,000	1,128,000	1,298,000
S. Australia..	6,113,000	6,677,000	219,000	320,000
W. Australia..	890,000	1,315,000	54,000	65,000
Queensland...	7,315,000	11,507,000	2,080,000	4,246,000
Tasmania.....	1,769,000	1,831,000	124,000	131,000
New Zealand.	11,500,000	13,384,000	600,000	700,000
Total.....	63,369,000	77,249,000	7,336,000	8,401,000

The railroads in operation and building in 1883 were as follows:

	In operation, miles.	Building, miles.	Total, miles.
New South Wales.	1,313	504	1,817
Victoria.....	1,355	340	1,695
Queensland.....	867	382	1,249
South Australia...	945	109	1,054
West Australia...	95	21	116
Tasmania.....	167	37	204
New Zealand.....	1,465	171	1,636
Total.....	6,207	1,564	7,771

Of land telegraphs there were in operation in 1882 altogether 31,516 miles of line, or 56,132 miles of wire, there being 1429 offices and 6,687,547 messages forwarded during the year, while cable messages amounted to 27,609 in 1881, and 34,342 in 1882. There are 4381 post offices, forwarding and receiving 108,674,469 letters and 55,837,312 newspapers in 1882.

Considering the smallness of the population, the figures we have given are something remarkable. The gain by excess of immigration over emigration has latterly not been large, having been only 43,359 in 1881 and 54,809 in 1882. This summer there has even been some emigration from South Australia to neighboring colonies, caused by the poor state of business in the former. In a country of such extent as Australasia, constituting, so to say, a world of its own and embracing many climates, there are, of course, periods when live stock and agricultural products do not yield as much as they usually do on account of prolonged droughts. The growing cane sugar industry of Queensland has latterly been less profitable, prices being low and plantation hands scarce, even at the comparatively high wages paid. New Zealand has been very prosperous taken as a whole, and has advanced even more rapidly than Australia proper. The leading city in New Zealand has a population bordering on 50,000, and is only inferior in size to Melbourne, 300,000, Sydney, 250,000, and Adelaide, 70,000.

Australasian public indebtedness at first sight appears large, £100,000,000, but when we consider that the debt was contracted mainly to pay for Government railroads, which are admirably managed and profitable, and also for other public works, we

shall see that it was a good investment. The aggregate income of the colonies exceeds the outlay, and Australian 4 per cent. loans command par in the London market, so that financially these colonies are safe. The joint revenue amounted in 1882 to £21,911.015 and the expenditure to £20,077,331. Considering that New Zealand's population does not much exceed 500,000 souls, the business done there is enormous:

	1884.	1883.	1882.	1881.
Importations	£7,663,888	£7,974,098	£8,684,076	£7,457,045
Exportations	7,091,667	7,095,999	6,654,344	6,060,266
Total..	£14,755,555	£15,070,087	£15,288,420	£13,517,911

showing an increase of total trade of 9 per cent. in three years. The wonder is that Australasia does not attract more immigration, and that in this respect the Argentine Republic, a less desirable country to settle in, has begun to outrun Australia and New Zealand together. The fact is that, in spite of rapid steam communication via Suez, Australia is still too distant, and that a current of emigration for the La Plata States was set in motion from Spain and Italy years ago, which goes on swelling because those States, being inhabited by Latin races and their descendants, are more congenial to Mediterranean populations settling abroad. Nothing is more difficult than to set flowing such a current, but, once properly established and nourished by good steamer lines, it requires but little stimulus.

The Gas Interest and the Public.

Some very startling figures have been brought out before the Senate Gas Committee, of New York, in regard to the profits realized by the gas companies of New York City since their organization. It was shown that one of them, the New York Gas Co., started in 1823 with an actual capital of $750,000, the issue of stock footing up to $1,000,000. Up to 1871 dividends had been paid aggregating $11,714,078, or over $240,000 as an annual average. In that year the nominal capital was watered to $4,000,000, and in the period from 1871 to 1884 further dividends amounting to $3,520,000 were distributed. In entering into the Consolidated company the shareholders received $7,600,000 of stock, so that in the aggregate their cash and stock returns from an original investment of $750,000 ran up to a total of $22,171,336.90 in 62 years, or nearly 50 per cent. per annum. Taking all the companies together who now constitute the present Consolidated company, they have received since their organization cash dividends footing up to $56,741,613 prior to the consolidation. The shareholders received, besides these dividends, the difference between the stock at par of the old companies and the consolidated stock now representing the same, or $20,479,000, making the total benefits obtained by them, in addition to the $15,500,000 of consolidated stock that they now hold, $79,418,703. Such figures amply prove that public opinion is correct when it condemns the prices charged for many years by the gas producers as extortionate. The gas interest allowed a feeling of hostility to grow up which is now deeply injuring them in many ways. Large profits have invited competition which receives perhaps undue encouragement from consumers, from town councils and State authorities and from capitalists. Under the belief, usually too well justified, that the manufacturing of gas was attended with very large profits, there were always many who would be ready to listen to schemes for new works. There can be no doubt that unscrupulous promoters have often taken advantage of this. They have floated concerns simply for the sake of making a profit in building the works. The operation of the latter only wasted the money of the investors, did great injury to the older company, and ultimately imposed the burden of paying interest on unnecessary capital upon the public. The latter has become very sceptical now as to the benefits to be derived from the panacea of competition. There are numerous examples that rival corporations, after a bitter fight, have either pooled their issues to rob consumers in harmony, or one has absorbed the other, and has promptly advanced the price of gas to recoup. In many respects, therefore, the public, the old companies, and newcomers in the gas interest have had unsatisfactory experience.

It is therefore with much interest that we observe the change which has steadily and rapidly been gaining ground among those identified with the manufacture of illuminating gas. At a meeting of the American Gaslight Association at Cincinnati in October a remarkable paper was presented by John C. Pratt, of Jamaica Plain, Mass. Mr. Pratt three years ago enunciated the views to which we shall allude, and he was indorsed last year by Mr. Fortstall, president of the association. The position occupied by him is not, therefore, one strikingly novel, but to us the surprising feature brought out by the presentation of the paper in question was the fact that it was received with such acclamation and so many expressions of approval.

Formerly, and to some extent now, the principles guiding the management of gas companies was to charge as much as the public would bear, keep information as to its affairs as secret as possible, and fight any opposition by fair means or foul. Now comes Mr. Pratt, with apparently the majority of the thinking men in his business agreeing with him, and urging that all that must be changed. The public is to know exactly what it costs to manufacture and distribute the gas, and is to be charged only such prices as will insure a fair dividend on the actual capital invested. He insists that there be no profits on watered stock, no unreasonably large dividends. He holds that, if the gas companies will treat the public fairly, then the people will be true to it. It is of the greatest interest to the gas company that its relations to the community it supplies should be as cordial as possible. Mr. Pratt urges the producers of illuminating gas to sell at the lowest possible price consistent with fair and moderate dividends He insists on full publicity of the results of the business, and holds that efforts should be made to educate the public to understand many points now obscure in connection with gas matters. On the other hand the gas companies are entitled to protection against any raids upon their interests. This is to be done through the appointment of a gas commission, with power to regulate the price of gas and to give or withhold their approval to the granting of new franchises for building and operating works. This is undoubtedly a move in the right direction, but some provision should be made to give latitude to the introduction of improved and cheaper methods. It may happen that a gas company, secure in a fair return on its investment, may decline to test new methods or to introduce improvements which have borne successfully the test of practical work on a large scale. There should be some safeguard for the public that due diligence and enterprise be shown to obtain a cheaper product.

England and Free Trade.

A correspondent of *The Ironmonger* has been putting some very pertinent as well as impertinent questions to another correspondent who has been writing regarding free trade. Two of these questions are especially pertinent. He asks:

1. If free trade is such a good thing as we are led to believe, how is it we are still the only free traders on the face of the earth?
2. Did not Mr. Cobden use the stock argument that, given free trade in England, every other nation would become free traders before 10 years had expired?

To the first of these, we imagine, it will be difficult to reply; the second, however, can easily be answered. Mr. Cobden did use that stock argument. He prevailed upon the French Emperor to agree with him in this view, and to make a treaty of commerce with England somewhat in accordance with his ideas. This gentleman also hoped that before the expiration of this treaty of commerce the French nation would see the beauty and delightfulness of free trade, and would become free traders. The result was contrary to Mr. Cobden's expectations. The treaty of commerce was the beginning of the downfall of the French Emperor. It resulted in the first organized opposition to his policy; this organized opposition inspired others, and before the treaty expired the French nation had been defeated in war, the French Emperor driven from his throne and into his grave. Upon its expiration the French Republic refused to continue it, and Mr. Cobden's hope of universal free trade ended in utter disappointment.

The great trouble with English free traders is that which has been so often pointed out, viz., that they start out with the proposition that there are certain immutable, eternal truths, and that these truths are the same for all nations, all times and all circumstances, what is right and best for one nation being right and best for all. Now, England being a nation that was admirably adapted to manufacturing, but without the ability to raise the food for its people as cheaply as it could be imported, free trade was the thing for England, and *ergo* it was the thing for the whole world. The world has refused to believe this, or to agree that because free trade is good for England it is good for all other nations. In a word, England believes that free trade is the international law. Other nations believe that it is not an international but a national one, and each country must settle it in accordance with what it conceives to be to its highest interests.

Co-operative stores have gained a practical monopoly of retail trade in some parts of England. In the elections recently held it is reported that at Walsall, near Birmingham, meetings of the tradesmen who were opposed to these co-operative stores were held and the following questions asked the candidates:

Will you, if returned as a member of the House of Commons, move in the House or support resolutions to the following effect: 1. That public trading by paid servants of the State ought to be suppressed, as it is a system detrimental to the proper discharge of their duties and highly unjust and injurious to the legitimate interests of the trading classes, who are heavily taxed for their support. 2. That co-operative stores trading with the public shall pay income tax the same as the ordinary trader. 3. And use your best efforts to secure a rigid enforcement of the law that forbids all State employees from trading or engaging in trading transactions, or accepting brokerage or commission, on the penalty of dismissal from the service?

If it is true, as these questions seem to indicate, that the co-operative stores, which are the severest competitors of retail tradesmen, enjoy privileges which are not accorded to individuals, such a condition of affairs certainly cannot be defended. Whatever burdens are laid by the Government upon the ordinary trader should without question be laid upon the co-operative stores. But the other phases of the movement brought forth in these questions would, in this country at least, meet with but little support. Here the theory is that a man upon entering into the public service does not surrender any of his rights as an individual, and that so long as he does not neglect his public duties he is at liberty to invest his money, become a partner in any enterprise or engage in any occupation that is lawful. Possibly the theory of the English public service is different, but we cannot see how any Governtment has a right to interfere with the private concerns of its servants so long as those servants do not neglect their public duties.

Electrical Laboratories.

We have remarked on several occasions that the most prominent want of electricians at the present time is an efficient electrical testing establishment. That this is true has no doubt been experienced by many in a most annoying form, and taking all circumstances into consideration it has always seemed somewhat remarkable that so little has been done toward a satisfactory solution of the difficulty. The benefits and conveniences afforded by an establishment of this kind can be easily imagined. It is interesting, therefore, to note that in one quarter at least the matter has met more than passing attention, promising developments of practical value. We refer to Prof. J. A. Fleming's recent paper before the British Society of Telegraph Engineers and Electricians, in which he clearly set forth the advantages and need of a national laboratory for standardizing electrical apparatus. Electrical engineers, as he there pointed out, are now using so-called standard instruments of their own, having no absolute title to uniformity, and the result is that their measurements cannot be accurate as compared with those made by other observers with other standards. National electric standards are requisite, just as they are requisite in weights and measures. The need of such standards being admitted, it becomes a question how the want had best be supplied, and accordingly developments in this particular direction in England, and their results, will be watched with much interest.

As Professor Fleming pointed out, such a laboratory would be doing valuable work if it undertook researches of an unremunerative nature, researches which private individuals have neither the leisure nor the means to prosecute. It was suggested at the meeting that the society should communicate with other learned societies upon the subject, and a resolution was put and carried to this effect. It is understood, therefore, that a committee of the council of that society will be formed to discuss the best ways and means for carrying out Professor Fleming's project. Whatever may be the result, even if unsuccessful as regards execution of the plan, it will not be without some benefit, showing that the importance of some of the requirements of progressing sciences is gaining appreciation, and giving hope that in the near future they will meet with that due consideration which has hitherto been given only in isolated cases.

There is a growing tendency to abandon the hydraulic test as an independent, self-sufficient means of determining the true condition of a boiler after having been in service, and all indications now point to the fact that the necessity of something more reliable is being generally appreciated. The advice so freely given that the hydraulic test should be cautiously and judiciously applied, and that its results should not be accepted with implicit confidence, is thus bearing fruit, even if only after years of experience. Those who have unbounded faith in the test and who do not hesitate to deny the necessity of any further inspection are happily decreasing in number from year to year, making room for men with a broader knowledge of the requirements of steam-boiler inspection and preservation. The hydraulic test has had ample opportunity of demonstrating its good and evil features, and it is only natural that a decline should be experienced in its popularity.

The literature of the superheated-water theory of boiler explosions, to which we have given attention on several occasions, and which has been repeatedly shown to have no reliable basis, has experienced another addition, in the shape of a contribution to the *Bulletin de le Societé Industrielle de Mulhouse* by M. H. Walther Meunier. The latter, after extended investigation, arrived at the conclusions that the state of absolute rest is indispensable for the production of superheated water, and that the presence of air or other gas, even in indefinitely small proportions, maintains ebullition under normal conditions. M. Meunier found from the official statistics of boiler explosions for six years (1877–82) in England, France and Germany that the proportions of explosions from unknown causes were 8 in 150 for England, 13 in 114 for France, and 3 in 100 for Germany. These average about 6½ per cent. On closer examination, however, the proportion of totally unknown causes for France is reduced to 3 per cent; for Germany there is no cause classed as totally unknown, and for England only 1 per cent., making a total average of 1.1 per cent. of totally unknown causes. This percentage is easily explained, in face of the difficult and laborious work of investigation after an accident, without making it necessary to ascribe its origin to the existence of superheated water. M. Meunier maintains that in a steam boiler, whether at work or at rest, there is continual agitation and circulation arising from differences of temperature, and that accordingly superheating of the water in the boiler is impossible. Besides, the presence of the smallest quantity of air is sufficient to impede or prevent superheating of water, a condition which is always fulfilled in practice, and which is clearly confirmed by the fact noticed by M. Meunier that, at the temperature of discharge of condensing water, 86° F., the tension of the vapor is 0.041 atmosphere, while there is never less than 0.12 atmosphere of back pressure, making the difference 0.079 atmosphere, which is only explained by the pressure of air. M. Meunier accordingly concludes that all boiler explosions may be explained by bad materials, bad construction, bad design or want of care and precaution.

WASHINGTON NEWS.

(From Our Regular Correspondent.)

WASHINGTON, D. C., December 22, 1885.

The revision of the rules of the House of Representatives having been rushed through by Mr. Morrison and his party supporters, aided by Republicans, the lower branch of Congress will be ready to proceed to business after the Christmas recess. Mr. Carlisle expectsto have his committees ready, so that there shall be no delay on that score.

The Committee on Ways and Means will have Mr. Morrison for its chairman, which will be constructed to suit his wishes. It is understood that Mr. Hewitt does not wish to be on that committee and will be made chairman of the Committee on Naval Affairs.

OPPOSITION TO TARIFF REDUCTIO .

The following resolutions introduced by Senator Cameron is now before the Committee on Finance:

Resolved, That, inasmuch as the business industries of the country at pressnt seem to be reviving, it is inexpedient during this Congress to pass upon any measure looking to a reduction of tariff duties.

Resolved, That any future reduction of the tariff should be based upon information common to the country as shown by complete census return, and at such definite periods as can be readily anticipated and met by the different producing interests of the country.

These resolutions make the issue so far as the Senate is concerned. The committee have received resolutions of approval from industrial associations, including the Eastern Pig Iron Association The committee will take up the resolution for consideration at an early date. It is understood that the Democratic and a few Republican Senators will oppose the resolution on the ground that they do not wish to be committed until they see what the House proposes to do. In some features, such as increasing the duties on wool, the reopening of that part of the question is deemed expedient; also to prevent undervaluation and improve the means of punishing fraud.

STRUCTURAL MATERIALS.

Representative Campbell, of Pennsylvania, will introduce the bill of the House Committee on Manufactures, of the Forty-Eighth Congress, to provide for a commission to test structural materials. This bill was once within five of passage, and only failed on account of the absence of some of its most active supporters. As there are many new Members in the House the work will have to be gone over. The friends of the measure might therefore as well put themselves in communication with their Representatives in Congress, so as to insure action at the present session.

THE CENSUS REPORTS.

Under the active and efficient direction of James H. Wardle, assisted by Aug. S. Boernstein, Rudolph Hampton, A C. Getchell and Miss M. C. Towles, the work of hastening the issue of the final publications of the census is being carried on with much success. The reports having direct relation to the industrial arts are in the following conditions: Recently issued, Vol. IX, "Forestry (Forest Trees);" Vol. X, "Petroleum, Coke and Building Stones;" Vol. XIII, "Precious Metals." In the hands of the printer, "Water-Power Used in Manufactures," two volumes; "Wages," one volume; "Mechanical Appliances," one volume; "Mining East of the 100th Meridian," one volume, and "Mining Lands," one volume. There remain to be published, "Sheep Husbandry and Wool Growing," "Gas," and nine other miscellaneous subjects.

RECENT DECISIONS.

The Secretary of the Treasury has rendered the following decisions in customs cases under the metal schedule:

Certain engravers' tools, commercially known as diamond point pencils, which are used by engravers for designing on glass or metal, and which consists of small splinters of diamond bort set in metal handles, are nowhere specially enumerated in the tariff acts, and therefore are dutiable at the rate of 45 per cent. ad valorem, under the provision (T. I., new, 216) in Schedule C for "articles * * * composed wholly or in part of * * * metal."

So-called jute velours, fabrics composed partly of jute and partly of metal thread, are dutiable at the rate of 45 per cent. ad valorem, under the provision (T. I., new, 216) in Schedule C for "manufactures, articles or wares * * * composed wholly or in part of * * * metal." (Letter to collector of customs at New York.)

RESPONSIBILITY OF TRANSPORTATION COMPANIES FOR DELAY.

The Secretary of the Treasury has informed customs officers that under the condition of the bond (Form No. 171 of the Regulations) given by common carriers for the immediate transportation of imported merchandise from the port of importation to the port of destination, the transportation company (or common carrier) is liable for any delay in transporting and making prompt report and safe delivery of all merchandise received by it for transportation. (Letter to collector of customs at New York.)

PACKAGES IMPORTED BY FOREIGN MAILS.

The Treasury Department decides that unsealed packages containing dutiable articles which are delivered, as required by the postal regulations, to the customs officers at the exchange office of receipt, are subject to the customs regulations relating to illegal importations, and will be retained for the proper action thereunder.

RULE AS TO DUCTILITY OF STEEL BOILER PLATE.

The Secretary of the Treasury has written the following letter to manufacturers explanatory of the application of the regulation as to the ductility of steel boiler plate: "In reply to your letter of the 21st inst. you are informed that the circular of September 28, 1885, modifying the rule for ductility of steel plate, was only intended to apply to plates ½ inch thick and under; plate over that thickness will be governed by the regulation as modified by the Secretary of the Treasury, February 19 1885, (embodied in Circular No. 22)."

DUTY ON IRON CASTINGS.

The department on an appeal has given the following construction of an assessment on unfinished parts of machinery, an appeal having been taken against an assessment of duty at 1¼ cents per pound. The decision says: "The appellant claims that the castings in question, which form parts of a machine forthe manufacture of ice, are in their rough, unfinished state, and are intended to complete a machine partly manufactured in this country, and that they are only liable to duty at the rate of 1¼ cents per pound under the provision in Paragraph 157, act of March 3, 1883 (T. I., new), 'for castings of iron not specially enumerated or provided for.' The appraiser reports that the machine is in an incomplete state, as represented by the importer, and that, in his opinion, the castings, which are in the condition in which they came from the molds, and which are invoiced separately, and are easily separable for purposes of classification, are dutiable as claimed by the appellant. This opinion is in harmony with the department's decision of July 25, 1877 (Synopsis, 3319), and you are hereby authorized to readjust the entry and to take measures for refunding the excess of duty."

Professor Thurston on Technical Training.

Prof. R. H. Thurston recently delivered a thoughtful lecture on the above subject before the Board of Trade of Scranton, Pa., from which we make the following extracts:

It is intelligence, not brute force, that governs the universe and conquers fate It is the humming spindles, the puffing engines, the rumbling iron devouring mills, each directed by active brains and guided by a few skillful hands, that do the work of the world; animal-power, whether human or brute, accomplishes but a very insignificant part of the work of this busy world of ours. The 3,000,000 000 bushels of grain annually grown in this country is transported to the millions fed by it over our 125,000 miles of railway, and over the 3000 miles of ocean, not by man, but by the inanimate forces commanded by his intelligence; not by human or even by brute muscle, but by Nature's power, directed by the mind of insignificant man, defying Nature's wildest untrained forces. He thus summarizes the requirements in this direction:

1. A common school system of general education which shall give all young children tuition in the three studies which are the foundation of all education, and which shall be administered under compulsory law, as now generally adopted by the besteducated nations and States on both sides the Atlantic.

2. A system of special adaption of this primary instruction to the needs of children who are to become skilled artisans, or who are to become unskilled laborers, in departments which offer opportunities for their advancement, when their intelligence and skill prove their fitness for such promotion, to the position of skilled artisans. Such a system would lead to the adoption of reading, writing and spelling books in which the terms peculiar to the trades, the methods of operation and the technics of the industrial arts should be given prominence, to the exclusion, if necessary, of words, phrases and reading matter of less essential importance to them.

3. A system of trade schools, in which general and special instruction should be given to pupils preparing to enter the several leading industries, and in which the principles underlying each industry, as well as the actual and essential manipulations, should be illustrated and taught by practical exercises until the pupil is given a good knowledge of them and more skill in conducting them. This series should include schools of carpentry, stone cutting, blacksmithing, &c., weaving schools, schools of bleaching and dyeing, schools of agriculture, &c.

4. At least one polytechnic school, in which the sciences should be taught and their applications in the arts indicated and illustrated by laboratory work. In this school the aim should be to give a certain number of students a thoroughly scientific education and training, preparing them to make use of all new discoveries and inventions in science and art, and thus to keep themselves in the front rank.

5. A system of direct encouragement of existing established industries by every legal and proper means, as by the encouragement of improvement in our system of transportation, the relief of important undeveloped industries from State and municipal taxes, and even in exceptional cases by subsidy. It is evident that such methods of encouragement must be adopted very circumspectly and with exceedingly great caution, lest serious abuses arise.

Such a complete scheme has as yet never been fully carried out; and yet it is easy to see that we are gradually working out its elements here and there piecemeal, and that the future, the near future, we may hope, will certainly see the whole system in full.

THE WEEK.

A banquet given by Erastus Wiman to Robert Garrett last week was to celebrate the consummation of the contract by which the Baltimore and Ohio secure terminal facilities at Staten Island, and prospectively the completion of another railroad trunk line between New York and the West. Mr. Wiman, in his speech delivered on the occasion, affirmed that on Staten Island, and on Staten Island alone, in the harbor of New York, can the three great factors of commerce be united at one and the same time—viz., receipt by sea, storage from sea and shipment by rail. Mr. Garrett, in response, predicted that within 10 years the importance of Staten Island to the harbor of New York will be second only to Manhattan Island.

A steel steamship has been contracted for in England at £20 per ton on her gross registered tonnage. She is to have steel boilers and steel shafting throughout, with triple expansion engines.

Upward of 3000 miles out of 15,000 miles of telegraphic and electric wires in Chicago have been put underground within the past year, and poles are gradually disappearing from the streets.

The proposed ship canal across Ireland would be 127 miles in length, and would contain 30 locks. For ships of 1500 tons the cost would be $40,000,000; for ships of 2000 tons, $60,000,000; for ships of 5000 tons and upward, $100,000,000. If built on this scale the canal would be 200 feet wide on the surface and 100 feet at the bottom. The passage through the canal would be effected by a system of towage, and it is estimated that the passage of a ship from Galway Bay to Kingstown will occupy between 24 and 36 hours.

It is said on alleged respectable authority that more than 500,000 pounds of willow leaf were shipped from Shanghai last year as green tea, a large proportion of it coming to America.

A railway is building from the Southern Pacific's main line to the quicksilver deposits at New Almaden, Cal. Great difficulties have always been experienced in getting cheap and suitable transportation to and from these mines.

General Jourdan has examined the electric-motor system in Baltimore with a view to its possible introduction on the Kings County Elevated Road, the construction of which has just been begun. He says he found the system working well.

The steamer City of Mexico, lying at the warehouses in Brooklyn, was suspected of being engaged in some filibustering enterprise, but after a quantity of arms and ammunition had been removed from the cargo she was permitted to proceed on her voyage.

The Expert Grip Committee, composed of several of the Brooklyn Bridge trustees, have engaged an office in the Welles Building, 18 Broadway, where engineers and inventors of grips will be received and their plans inspected for the next six months.

The manner of awarding contracts by the Kings County Board of Supervisors was made the subject of inquiry, and on Friday last a dozen contractors and dealers in materials met a committee of the board by invitation, to give their views on the subject. The Haviland Iron Works and the Eagle Iron Co. were both represented. Supervisor Michael J. Dady did not believe in the separation plan as regards iron and masonry work. He said in such cases there was trouble, for when the mason was ready the ironman was not, and the carpenter was behind when both were ready. He hinted that the certified checks put up by contractors were not always all right, and told of cases where bids had been accepted which would not pay for material used. Mr. Dady liked the New York plan in regard to bids. Several others spoke on the same subjects before the committee adjourned.

By the provisions of the will of the late Allen C. Lewis, Chicago is about to come into possession of a public institution resembling in many respects the Cooper Union of New York. The residue of the Lewis estate was left as an endowment fund for a polytechnic school of a high order, and, the amount having increased through profitable investment until it now amounts to about $800,000, the trustees will soon take steps in accordance with Mr. Lewis's design.

A Japanese bank in this city, a branch of an institution in Japan, is conducted by highly-educated and courteous natives of Japan, and is said to be doing a profitable business.

"The agents of Eastern mills," says the New Orleans *Times-Democrat*, "are purchasing their supply of cotton in the very center of what was once deemed New Orleans' particular and undisputed territory, and, instead of sending it in transit to Boston by way of this city, are shipping it up the river to Cincinnati and thence to the Eastern mills."

It is promised that the natural-gas pipe line now in progress from Buffalo to McKean County, Pa., will be completed in June at a cost of $1,000,000, of which one-fourth will be spent on terminal facilities.

The new steamship Mascotte, built by Wm. Cramp & Son for the Plant Investment Co., under a contract to carry the mails between New York and Havana via Tampa and Key West, made a successful trial trip. She has triple expansion engines—said to be the first ever put in a steamer in this country—with 19-inch stroke, 30-inch and 50-inch cylinders, 30-inch stroke, intended to work under 100 pounds of steam. The average speed of the engines is 118 revolutions per minute.

Manufacturing in Paterson, N. J., is gradually extending, with the exception that several silk mills are seeking a location in rural districts, where labor is cheaper.

The State Land Board, at Albany, denies the application for land under water at Staten Island made in behalf of the Baltimore and Ohio Railroad Co., but the latter expect to accomplish their purpose through a special commission.

The freight depot of the New York, New Haven and Hartford Railroad Co., located for many years in Centre street, in this city, will be removed January 1.

Cyrus R. Woolson, formerly of Cuba, and extensively engaged in the manufacture of agricultural implements, died suddenly in Newark on Thursday.

Mr. Shanks, president of the National Press Intelligence Co., proposes to transmit commercial correspondence by machinery over a new compound wire.

A new ordinance regulating import and export duties and ship dues at St. Thomas went into effect December 1. The import duty on all goods not in the free list is placed at 2 per cent of the value at last place of exportation, including costs and charges incurred in placing the goods free on board. The free list includes agricultural implements, sugar-mill material, machinery, &c.

In order to refine metals, separating gold and silver from their alloys, the United States Government maintains in this city a large and costly plant to do what in England and on the Continent is done at private establishments, and at the proper expense of those who are benefited by it. There are many who do not see the necessity for continuing the Assay Office, with its noxious fumes.

John D. Jones, president of the Atlantic Mutual Marine Insurance Co., was complimented last week by the presentation of a life like portrait of himself, in oil, from gentlemen prominent in under writing circles. In acknowledging the honor Mr. Jones said: "As an underwriter I have seen a want of some consulting body governed by adjusters to unify and maintain sound rules and principles in average adjustments, and by means thereof to facilitate merchants in the first conduct of their commercial relations, so far as relates to general average. I saw need of some professional organization that would so accredit its members in foreign commercial ports as to give character and standing to adjustments made by them. To my mind this association fills the want I have alluded to. By prudent action of the organization the members of it will soon be so known abroad in the world of ocean commerce that a certificate of membership of its organization will serve as a letter of good standing in all matters relating to adjustments, without the requirement of outside indorsing."

General trade in Mexico is improving except at Vera Cruz, which suffers from the diversion of freight by the new railways on the northern frontier, and the Texas city of El Paso, which is becoming a distributing center for interior points, is making rapid progress. European goods continue to find entrance into the country via the northern custom houses of Paso del Norte, Piedras Negras and Nuevo Laredo.

How surely the Norwegians are monopolizing the shipping trade of the St. Lawrence is shown by a comparative statement just published of arrivals from sea at Quebec during the past season and in 1884. Of a total of 580 arrivals in 1885, as compared with 564 in the previous year, only 306 were British vessels, including all the steamships, as against 249 Norwegian vessels.

The Singer Sewing Machine Co. resist the attempted collection of the local tax on their works at Elizabeth, N. J., and in consequence of a levy upon their property have discharged all their employees, who number 2500. President McKenzie says: "We have a factory in Scotland now much larger than that at Elizabeth, capable of turning out 500,000 machines annually. This, with our other factories at Vienna, Montreal, South Bend and Cairo, can carry us along for some time if need arises." The company, in defense of their action, allege that they hold the bonds of the city for a large amount, and insist upon their puyment for full face value, whereas the city authorities refuse to pay more than 50 per cent. of the par value, in accordance with an existing agreement with a deceased president of the company. The corporation attorney, moreover, takes the ground that the tax payment and the bond question are in no way connected, and must be settled each independently. The matter has been compromised and the works have been started again.

A new system for furnishing correct time to any number of offices or houses from a central station is on exhibition on Broadway. The vital principle of the invention is the use of compressed air to wind and regulate ordinary clocks Attached to each clock is a little upright brass cylinder, within which is a rubber bellows. A tube conducts compressed air from the central station to inflate the bellows, and the current of air is so regulated that a blast sends the bellows up at the end of every hour. The rise of the bellows winds the clock as much as it has run down during the hour, and also throws the minute hand around exactly to the XII mark, provided the clock has gained or lost anything during the hour. The machine for creating the air blast is operated by water pressure from the city water mains or any other unfailing source. The blast is controlled by means of a regulator clock which opens an electric current at the right time

Texas has five great cotton and sugar plantations on which to employ convict labor. The last addition is a tract of 500 acres, purchased from Williams & Guion, of New York.

Judge Donohue decides that a railway track can be laid in Chambers street and Duane, New York, and accordingly dissolves the injunction brought by the cable company.

Cuban exiles and others in the Argentine Republic are producing large quantities of cane sugar, the yield last year amounting to 50,000,000 pounds.

At a conference at Liverpool of the Atlantic steamship companies it was decided that the present freight rates were profitless, and an advance of 50 per cent. is considered probable.

The new British man-of-war Camperdowns built of steel at a cost of $2,375,000, is the heaviest ship ever launched from the royal slips in England. It will be three years before the Camperdown is ready for sea.

Bills to encourage the manufacture of steel for modern ordnance and armor plating have been introduced in Congress by Senator Cameron. The Secretaries of War and of the Navy respectively are directed to make contracts, after suitable advertisements, with responsible steel manufacturers for a supply of rough-bored rough-turned and tempered steel for the fabrication of heavy ordnance adapted to modern warfare, and steel for armor and other army and naval purposes, in quantity not to exceed 10,000 gross tons, in quality and dimensions conforming to specifications. Bidders are required to guarantee to erect in the United States a suitable plant capable of making all the steel required and of finishing it in accordance with the contract, and to agree, in the case of the ordnance, to deliver yearly a specified quantity of each caliber, the time of delivery of the smaller caliber to commence at the expiration of not more than 18 months, and that of the largest caliber at the expiration of not more than three years, from the date of acceptance of the contract. The Secretary of War is directed to erect at Watervliet Arsenal, West Troy, N. Y., an army gun factory, and the Secretary of the Navy at the navy yard at Washington, D. C., a naval gun factory, in accordance with the report of the Gun Foundry Board, for the fabrication of the heaviest guns adapted to modern warfare, the manufacture of gun carriages and ordnance equipments for each service, at a cost not to exceed $1,000,000 in each case.

The trade of Chicago are greatly exercised over the discrimination in railway rates against that city. Mr. Charles Pope, a prominent merchant, states that "the whole theory and method of the leading railroads leading East seems planned to divert tonnage around or away from Chicago, the object plainly being to keep business from the water routes—the Great Lakes and the Erie Canal. The railroads aim to cripple these natural highways of commerce and defeat the low-price competition they offer. It was well known that during nearly all last winter grain was hauled from Mississippi River points to the seaboard at rates 20 to 40 per cent. below those charged from Chicago, though the mileage was 20 per cent. greater. The following figures show what railroad discrimination has done in a few years:

Corn.

Crops.		Receipts at Chicago.	
1879	1,548,000,000	1880	97,272,844
1884	1,800,000,000	1885	71,148,190
Increase	352,000,000	Decrease	26,124,654

Wheat.

1877	420,000,000	1879	34,106,100
1884	513,000,000	1885	19,000,000
Increase	93,000,000	Decrease	15,106,100

Railway discrimination was the sole and only cause of this deplorable loss of trade. In order to remedy this there should be strong, unceasing, individual and allied labor in the way of diplomatic effort, and by personal work with the controlling railway powers. Should these fail, there remain other weapons of defense."

Senator Beck has introduced a bill in Congress with the object of seeing whether American importers are oppressed by being made to pay unnecessary fees from which American consular officers derive benefit. State Department officials claim that the fee exacted of shippers is not heavy, and that the benefit to American revenues in preventing undervaluations is immense.

The resources of the loan and trust companies of New York and Brooklyn have increased within the last 10 years from less than $70,000,000 to more than $165,000,000. Two companies alone in this city now have combined resources nearly as great as those of all the companies in the State in 1875. These are the Union Trust Co., with $27,076,787, and the United States Trust Co., with $37,899,586.

King Leopold, of Belgium, says there is nothing to prevent the immediate construction of the projected railroad in the Congo country, the fund being in readiness.

The use of wire netting in oyster culture furnishes invaluable results. After many experiments Professor Ryder, at a recent meeting of the Washington Biological Society, announced the result of his studies. To use his own words, "We have reached a point where we can safely say the problem of oyster culture is solved. We have been sounding it for many years, and have now struck bottom." The young oyster, for some time after it is hatched, swims in a free state upon the surface, where it is liable to be destroyed. Mr. Ryder's plan is to construct a ditch, serpentine in form, having nets of galvanized wire placed perpendicularly about 1 foot apart, and extending from the surface to the bottom. This will give the greatest possible amount of attaching surface in a given area. In a ditch 400 feet long constructed after their plan, and having an area equal to a pond 40 feet square, 400 such baskets may be placed, giving a very large amount of available room for the young oysters to fix themselves. A bushel of "brood oysters" will deliver 1,000,000,000 embryos, and of this vast number swept back and forth by the tide in the narrow ditch few would be so unfortunate as to pass through without striking one of the wires.

Commissioner Patten, in his report to the Bureau of Navigation, presents a record of the number and tonnage of the vessels of the various maritime countries, from which it appears that Great Britain has 14,959 seagoing sailing vessels, of 4,714,746 tons, and 4852 steamers, of 6,464,362 tons; the merchant navy of the United States, 6284 seagoing sailing vessels, of 2,138,880 tons, and 355 steamers, of 545,187 tons; Germany 4404 vessels of all kinds over 10 tons measurement, with a total tonnage of 1,231,062; Norway, 4086 seagoing vessels, with a tonnage of 1,443,741, and 266 steamers, with a tonnage of 141,452. The total number of vessels employed in the different coasting trades and fisheries of the Atlantic and Pacific coasts, including the Western rivers and all inland navigation, excepting the Northern lakes, on June 30, 1885, was 19,123, and their tonnage 2,455,720. Of this number 13,862 were sailing vessels, 4111 steam vessels, 256 canal-boats and 894 barges. The total number of vessels engaged in the coastwise trade, excluding those engaged in the fisheries and upon the Northern lakes and Western rivers, is 15,918, and their tonnage 2,001,917. Commissioner Patten gives figures to show that our coasting trade is by far the most flourishing branch of the United States merchant marine, and says: "If we include our lake and river tonnage it is the most formidable coasting fleet in the world, surpassing in point of tonnage the combined mercantile navies of any two nations, excluding Great Britain."

The Gas Trust dispute in Philadelphia was settled under the decision of Judge Thayer by the payment of the surplus of about $2,000,000 to the sinking fund commissioners.

The French Government has submitted a draft of a commercial treaty between France and China to Li Hung Chang, the Chinese Prime Minister, and is about to negotiate with Madagascar for a treaty of peace.

The Commissioner of Navigation, in his annual report just completed, notices the deterioration of American seamen, and recommends the establishment of an apprentice system, accompanied with nautical instruction. He might find some difficulty in securing desirable positions for graduates until there is more inducement to extend our maritime tonnage by building new vessels.

The jute manufacturers of Berlin have resolved to abstain from all extensions of works till 1887. There are intimations of similar action on the part of other industries.

A preliminary trial trip of the new fire boat Seth Low, built by the city of Brooklyn, was made on Saturday, under direction of William Cowles, her designer, and was very satisfactory. The Low is 99 feet 3 inches long on deck, 23 feet beam, 8 feet 6 inches deep and draws 7 feet 6 inches. She is fitted with two overhead direct-acting engines, with cylinders of 16 inches diameter and 8 inches stroke. These engines are independent, and if at any time one breaks down the other will be available, or they can be worked together, as desired. The boiler is 9 feet 3 inches in diameter and 14 feet long. It contains 1810 square feet of heating surface and 56 square feet of grate surface, and has three furnaces. The boat is fitted with twin screws 6 feet in diameter and having 9-foot pitch. Her pumps, two in number, are of the double-acting pattern, with steam cylinder 16 inches in diameter and giving 10 inches stroke of piston, and the water cylinders 8 inches in diameter and 10 inches stroke. A special feature of the Seth Low is the introduction of two stationary swivel nozzles at the forward end of the vessel; each is designed to throw a 3-inch stream 300 feet. The pumping capacity of the new boat is 3200 gallons per minute. The cost complete of the boat is less than $34,000. Her hull was built by Messrs. Trundy & Murphy, of South Brooklyn, and her machinery constructed by McWilliams & Brown, of Jersey City.

A strand in one of the Brooklyn Bridge traction cables broke on Sunday, interrupting travel. The accident was caused by the unfastening of an end of one of the strands where the cable is spliced. The free end of the strand caught in passing around one of the drums and was unwound for about 150 feet. Ten to fifteen professional riggers were at once set to work to mend it. The cable was at first firmly secured on either side of the break by means of ropes attached to the cross-ties, and the intervening or broken portion thereby slackened sufficiently to be raised over benches, so that the riggers could work on it. They then proceeded to unwind the broken strand inch by inch and wind a new one in its place for a space of 300 to 400 feet. Every turn of the splice was hammered to make it fit evenly in the groove. After nightfall the men worked by the light of lanterns, and the splice was finished about midnight. A similar break, though not so serious, was discovered several months ago and mended without noticeable delay in the running of trains.

Lieutenant Zalinski's recent experiments were with a dynamite cartridge, the construction of which is thus described by the *Electrical Review*: "The cartridge consists, first, of a conical projectile weighing about 100 pounds, through whose center has been bored a small cylindrical groove. In this groove are two electrical batteries, one wet and one dry, from which a little platinum wire runs into the next part of the cartridge, a brass cylinder containing 100 pounds of dynamite. Behind the dynamite, in the last of the battery, is a heavy log of wood. By a contrivance of Lientenant Zalinski, whenever the projectile strikes after its discharge from the pneumatic gun, the shock jars the batteries, the platinum wire becomes incandescent in the midst of the dynamite, and of course explodes. The cartridge is necessarily fired from a pneumatic gun, since powder guns discharge the dynamite immediately by the shock of the explosion.

John Christopher Draper, M. D., LL.D., professor of chemistry in the medical department of the University of the City of New York, professor of natural history in the College of the City of New York, and widely known on both sides of the Atlantic as a writer upon medical and scientific subjects, died on Sunday morning after a brief illness. Professor Draper was born on March 31, 1835, in Virginia. He was the oldest son of Prof. John W. Draper. He entered the University of the City of New York in 1852, and left it in 1854 in his junior year. He then entered the medical department of the university, from which he was graduated in 1857. For a year prior to this he had held the position of house physician and surgeon of Bellevue Hospital. In July, 1857, he went to Europe for the double purpose of advancing his studies and regaining the health which he had lost by a too persistent application to them. Upon his return, in December, 1858, he was appointed analytical chemist in the University of the City of New York. This position he retained for 13 years. In 1860 he assumed the professorship of chemistry in the Cooper Institute, but relinquished it in three years. For six months, in 1862, Professor Draper served as surgeon in the United States Volunteers, and was on General Wood's staff at Harper's Ferry when that place was surrendered. In 1863 he became a member of the New York Academy of Medicine, and became a member of the council of that institution in 1870. It was also in 1863 that Professor Draper was elected to the chair of natural history of the College of the City of New York. This position he retained up to the time of his death. In 1866 he became professor of chemistry in the medical department of the University of the City of New York. As one of the faculty, of which he was the senior member, Professor Draper was instrumental in placing it in the front rank of medical institutions in the country. By his associates he was looked on as one of the pillars of the University, of which he was also the treasurer.

Stephen Barker Guion, the well-known founder of the steamship company that bears his name, died in Liverpool on the 19th inst., of apoplexy. Mr. Guion was born in this city on June 17, 1820. In 1834 he entered into partnership with John S. Williams, forming the firm of Williams & Guion. In 1850 Mr. Guion moved to Liverpool and established there the firm of Guion & Co., organizing the famous Black Star Packet Co., and in 1865 Mr. Guion founded the steamship line known at that time as the Liverpool and Great Western Steamship Co. Later on, when Mr. Guion observed the demand on the part of the public for very fast vessels, he ordered of John Elder & Co., of Glasgow, the steamers Arizona, Oregon and Alaska, three of the speediest ships that ever crossed the Atlantic.

The Prussian Reichstag this session will pass upon the projected canal between the mouth of the Elbe and Kiel Bay. The digging of the canal, it is estimated, will cost about $36,000,000. It is proposed to make the canal 200 feet wide and 28 feet deep. The canal will shorten the journey from Hamburg to Bal by 637 miles.

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54 in. diam. of cylinder x 48 in. stroke;

VARIABLE CUT-OFF.

50-Ton Band Wheel,

20-ft. diam. x 60 in. face.

At a great sacrifice.

Engines, 4 to 100 H.-P. 10 H.-P. Baxter Engine. Worthington Pump. Sturtevant Blowers, Nos. 8 and 38. Hydraulic Presses and Pump. Five Upright Boilers, 60 Horse. Pumps, Tanks, &c.

MARVIN BRIGGS, 69 Rutger St., cor. Water.

FOR SALE or WILL RENT—My new brick shop in city of Worcester, Mass., built heavy for any kind of works; 100 feet long, 48 wide; 4 story, with basement; within a few feet of three railroads. Inquire of

LEWIS DEAN,
Worcester, Mass.

FOR SALE.

A second-hand Ferris & Miles Steam Hammer. Weight of ram, 1500 pounds. Address

J. H. STERNBERGH, Reading, Pa.

Wanted.

SECOND-HAND LIGHT T RAILS to lay 2000 yards Track; also Dump Cars.

Address "BOX 261,"
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AN Experienced Hardware Clerk or Stockman wants situation; good references, 7 years.

"STOCK,"

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WANTED—PATENTED NOVELTIES

to manufacture and put on the market. Address, with full particulars, "COCHRONE,"

Office of *The Iron Age*, 38 Clark St., Chicago, Ill.

A YOUNG MAN with four years' experience in the wholesale Hardware business wishes position in the retail business in the West; reference from present employer. Address

J. E. DeCRAY, care H. & G. E. KNIGHT,
21 North 5th St., Philadelphia.

Manufacturers of staple or attractive Hardware or kindred goods, desirous of obtaining an agency for their sale in this city, in a central location and with a leading firm, may address

"ADVERTISER," Box 88,

Office of *The Iron Age*, 83 Reade St., New York.

SITUATION WANTED

By a practical Nickel Plater and Polisher of large experience. Address WM. M. CRONYER,

Care THE BOWER MERRILL CO., Indianapolis, Ind.

Special Notices.

SPECIAL NOTICE.

WE ARE NOW OFFERING

SPECIAL DISCOUNTS

ON

SHAFTING COUPLINGS, HANGERS AND PULLEYS.

The Edison Shafting Mfg. Co.,

86 to 92 Goerck St., New York.

CATALOGUES AND PRICE LISTS MAILED ON APPLICATION.

FOR SALE.

A Valuable Rolling Mill and Wharf Property

on Delaware ave, above Poplar St., now occupied by the Philadelphia Iron and Steel Co., having a frontage on Delaware avenue 167 feet, and extending eastwardly in parallel lines to Delaware River about 500 feet; Pier 65 feet wide and about 200 feet long, with two docks respectively 75 and 50 feet. The pier is within 60 feet to the Warden's line. On the property there is a very valuable Rolling Mill now running, embracing Puddling Train, Squeezer, one 18-in. Train, one 12-in. Train, two 8-in. Trains, with three (double) Puddling Furnaces and one single, with Boilers, Heating Furnaces, Shears, Engines, Scales, with rolls to make Angles and Tees up to 4 inches, and Flats up to 8 inches and Rounds to 3⅝, and many shapes of different kinds; also Universal Mill. We would particularly call attention of capitalists to this property. The wharf property will be sold separate from the machinery, if so desired; a portion of the purchase money can remain. For further information inquire on the premises.

JOHN H. BRINGHURST, Pres., 939 North Delaware Av.

FOR SALE

BY

WILLIAM SELLERS & CO.

We offer for sale eight Swing Cranes, running from 10 to 50 tons capacity. One of the 50-ton Cranes is driven by steam and geared so as to raise or lower the load and run it in or out and swing the jib simultaneously. The Cranes are in good order. We are taking them out of our foundry to make room for a high-speed power Traveling Crane we have just designed and built.

For further information, address

WM. SELLERS & CO., Philadelphia.

For Sale.

The Good-Will, Stock and Fixtures of the POINT PLEASANT IRON AND BRASS FOUNDRY, No. 951 Beach St., Philadelphia, comprising five large Cranes, three Cupola Furnaces, two Engines, Boiler, Blower, and all appliances for a first-class Foundry. The Patterns comprise one of the largest assortments of Cog Gear in the country, as well as a full line of Patterns for Vessels, Rolling Mills and miscellaneous work. The premises can be leased on favorable terms. Apply to

JAMES T. BRADSHAW, Proprietor,
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FOR SALE.

15 Lever Lard Presses complete.
Lot of Lard Press Parts and Plates.
3 Cast Iron Sup rheaters.
1 large Screw Press (Hand.)
75 tons extra heavy Cast Scrap.

ROBERT MOFFLY & CO.,
N. E. cor. 9th and Jefferson Sts.,
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For Sale, Cheap.

One 20 x 48 Horizontal Corliss Engine.
One 16 x 48 " " "
One 60-lb. Air Cushioned Hammer. Merrill & Son's make.
One 100-lb. Spring Hammer. Peenelt & Gerhard.
One No. 5 Blake Steam Pump.
One No. 3. Deane " "

D. B. CRUICKSHANK,
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ROOT BLOWERS, Nos. ½, 1, 2, 3, 4, 5 and 7.
BAKER BLOWERS, Nos. ½ and 2.
STURTEVANT BLOWERS, 1, 5, 6, 7, 8, 9 and 10.
SUGAR HOUSE MACHINERY, Vacuum Pans, Tanks, Wagons, &c.
ENGINES, 16x36, 14x24, 10x30, 8x14, 6x12, 3x6, &c.
WANTED TO PURCHASE: Root Blowers, Power and Blacksmiths' size; also Baker Blowers; a 250 to 300 H.-P. Horizontal Engine, A1 order; LARGE SHEAR for Scrap Iron; a large STEAM HAMMER for blooms; Variety Moulder and Band Saw; a Ventilating Fan.

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MANUFACTURERS of Builders' Hardware, Mechanics' Tools, Nails, Specialties or kindred lines, wanting to be represented before the first-class trade of Missouri, Kansas, Nebraska and Iowa, in a safe and inexpensive way, by a responsible Salesman with an established trade, who can give business references or security, will find it to their interest to address

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POSITION WANTED—By a young man who has had several years' experience in the factory and on the road for an Eastern Hardware firm. Address for information

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SITUATION WANTED

As a Hoop Roller; have had ten years' experience. Address "ROLLER,"

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MACHINE PATTERN MAKER of 15 years' experience, used to Engines, Pumps, Loam and General Foundry Work, desires a situation as Foreman or otherwise. References given.

THOS. TOBIN, Box 460,
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A Thorough Hardware man desires engagement as Buyer, Salesman or Traveler. Long experience, best references.

Address "C. B."

Office of *The Iron Age*, 83 Reade St., New York.

AGRICULTURAL SALESMAN.

Situation wanted by good Agricultural Salesman, experienced in business. "N."

Office of *The Iron Age*, 83 Reade St., New York.

COMPETENT Office Manager and Accountant, conversant with finances and credits, familiar with details of stock and shipping-room and the purchase of supplies for manufacturing business, will be open for engagement from January 1st. City or country. Address "FIDELE,"

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Special Notices.

SECOND-HAND MACHINERY

In Good Order. For Sale Cheap.

1 Engine Lathe, 42 in. x 10 ft. bet. centers.
1 " 48 in. x 20 ft. bed.
1 " 36 in. x 18 ft. "
1 " 30 in. x 16 ft. "
1 " 28 in. x 20 ft. " Pond.
1 " 20 in. x 10 ft. " "
1 " 24 in. x 12 ft. " Fifield.
1 " 20 in. x 8 and 10 ft. bed. Putnam.
1 " 17 in x 8 ft bed.
1 " 15 in. x 6 ft. Porter. Rod feed only.
1 " 15 in. x 6 ft. Flather, with turret.
2 Hand Lathes, 13 in. x 4 and 5 ft. Garvin.
1 Planer, 50 in. x 50 in. x 17 ft.
1 " 20 in. x 20 in. x 4 ft.
1 " 36 in. x 36 in. x 7 ft.
1 " 32 in. x 32 in. x 9 ft.
1 " 17 in. x 17 in x 3 ft.
1 Shaper each 20 in. and 24 in. stroke.
1 26 in. Back-Geared Drill.
1 20-in. Plain Drill.
1 24-in. Gear Cutter.
1 Lincoln Pat. No. 2 Miller.
1 each 3, 4 and 6 Spindle, No. 0 Drills. P. & W. Co.
1 No. 2 Screw Machine. Wire feed. Pratt & Whitney.
1 No. 3 " " Plain.
1 16-in. Stroke Crank Planer.
1 10 H.-P. Vertical Engine and Boiler.
1 375-lb. Drop Hammer. Beecher & Peck.
1 40 lb. Trip Hammer.
1 12 in. Weston Electro-Plating Machine.
1 No. 3 Stiles Press.
3 Foot Presses.
2 Return Tubular Boilers, 16 ft. x 48 in.
1 Vertical " 54 in. x 8 ft.
2 Hoisting Engines, 8 and 10 H.-P.

Also full line of New Machinery.

New York Agency TAYLOR MFG. CO., Engines, Boilers, &c. Correspondence solicited.

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P. O. Box 3362. No. 42 Dey St., New York City.

FOR SALE.

Large lot second-hand Iron Tanks, from 5000 gals. down, all sizes and shapes.
Large lot new Mule Shoes
Large lot new 100 gal. Oil Tanks.
Three very large Cast Iron Kettles suitable for soap or chemical use.
50 tons Red Brass. 500 tons Wrought Scrap Iron.

BUSSENIUS, CUNLIFFE & CO.,
12th and Washington ave., Philadelphia,
Dealers in Scrap Iron and Old Metals.

FOR SALE CHEAP.

One "Strange" self-feeding and self-setting Barrel and Hogshead Stave Machine, 20-in. saw, 36 in. stave, nearly new; cost over $425 and will sell it for $240, cash; owner died and no use for it in this section. Also Portable and Stationary Steam Engines, Boilers, and the Eclipse Fan Blower, Tire Benders, and small Engines.

Address EZRA F. LANDIS,
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ENGLISH PLANER

For Sale.

Will plane 4 feet square and 12 feet long. Double Head. But little used.

STILES & PARKER PRESS CO.,
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FOR FARM PROPERTY.

Hardware stock of about $5000, with good-will, in Milton, Pa. Goods in first-class condition. Reason, retiring from business.

Address EDMUND DAVIS,
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BAND AND ROD IRON

For sale by

DAN'L W. RICHARDS & CO.,
88 to 96 Mangin Street, New York.

FOR SALE.

One Small Locomotive.
One Mill Derrick, on wheels.
One Riehlé Testing Machine.

Apply to P. O. Box 65, Baltimore, Md.

WANTED.—Position by Chemist; would prefer to have charge of Furnace in connection with duties in laboratory. Have practical experience in making all grades of Open-Hearth Steel. Also mixes for Special Soft and Tool.

Address "METALLURGICAL CHEMIST,"
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For Sale.

The entire plant of the Easton Lock Works, consisting of machinery, tools, &c., used in the manufacture of Locks and Knobs, together with all patterns, dies, &c. Inquire of

HESS BROS.,
Easton, Pa.

FOR SALE.

An old-established wholesale and retail Iron and Steel and Heavy Hardware business, with unexpired lease of store, storehouse and dock, in a manufacturing city of 40,000 inhabitants. Can load and unload direct from cars to storehouse or from boat. Reason for selling, poor health. A good paying business for the right party.

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WANTED.—A situation as Foreman in an Iron Foundry. One who has had 20 years' experience as such. Is a practical Moulder and thoroughly competent to take full charge on large or small work. Has been very successful in handling of workmen. Would like to correspond with parties in need of a Foreman.

Address to "FOUNDRYMAN,"
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WANTED.—A position as traveling Salesman from January 1st, by an experienced Hardware Salesman who has successfully represented one of the largest manufacturing and jobbing houses in the country; has a valuable acquaintance with the wholesale trade East and West, and is competent to negotiate large sales. Address "SALESMAN,"
Office of *The Iron Age*, 83 Reade St., New York.

DROP WANTED.

A good second-hand Drop (200 to 300 lb.) Hammer. Address, giving lowest cash price and full description, and make and condition,

THE SYRACUSE FORGING CO.,
32 Basin Street, Syracuse, N. Y.

WANTED.

By a young man, an experienced Chemist, who has been connected with Mines, Blast Furnaces and Steel Plants, a "Mill Job," Timekeeper, Pulpit Hand, Asst. Supt or the like. Address "MILL JOB,"
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WANTED.—First-class business man, Bookkeeper and experienced Rolling Mill Manager, wants position about January 1st. Is engaged at present with company about to close business. Understands handling men, and thoroughly competent to make all shapes of Iron. Highest testimonials. Address "J. J. R.," No. 229 Market St., Camden, N. J.

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SECOND-HAND, A1 ORDER.

Brown & Sharpe Universal Miller. Large and small.
Pratt & Whitney No. 2 Miller. Lincoln Pattern.
" " Marking Machine.
" " Screw Machine No. 3. B'k Gear.
" " Engine Lathe, 15 in. x 6 ft.
" " " " 16 in. x 5 ft. Taper.
Putnam Engine Lathes, 17 in. x 6½ ft. No screw. Rod feed only.
Pond Engine Lathe, 16 in. x 7 ft. Complete
Harrington " " 16 in. x 6 ft. "
Lincoln " " 17 in. x 8 ft. "
Bridgeport " " 16 in. x 8 ft. "
New Haven " " 18 in x 8½ ft. "
Rowland " " 21 in x 12 ft. "
Ames " " 20 in. x 10 ft. "
Pond " " 20 in. x 10 ft. "
Blaisdell " " 26 in. x 12 ft. "
Perkins " " 26 in. x 16 ft. "
Putnam " " 42 in. x 16 ft. Rod feed only.
Saunders' 8-inch Pipe-Threading Machine, patent dies. Good as new.
12 in. Shaper. Gould.
20 in. x 4 ft. Planer. New Haven.
26 in. x 6 ft. " Hendey.
36 in. x 12 ft. " Niles.
42 in. x 12 ft. " N. Y. S. E. Co.
30 in. Drill. Prentiss, nearly new.
No. 3. Stiles Punch Press.

Bolt Cutters, Milling Machines, Drills, Shapers, Lathes, Planers, &c., new, and also a line of second-hand machines not mentioned above.

State what you want to buy, and we will be glad to correspond with you.

Call and see us.

E. P. BULLARD,

14 Dey Street, New York.

MEYER, KINGSLAND & CO.,

Wholesale Auctioneers,

No. 10 Warren St., New York.

Regular sales of Hardware, Cutlery, &c. Sales cashed promptly. Consignments of goods solicited.

FOR SALE.

Merchantable Hoops, 1¾ x No 16 and No. 17, and 1½ x No 17, in lengths from 2 to 5 feet.

A. R. WHITNEY & CO.
P. O. Box No. 33. New York City.

E. BISSELL & CO.,

Wholesale

HARDWARE AUCTIONEERS,

83 Chambers and 65 Reade Sts., New York.

Sales held weekly for the trade. Consignments solicited. We refer to the leading manufacturers and importers.

Cotton Gin Ribs.

HARDWARE MERCHANTS

and others furnished with materials of all kinds for making and repairing COTTON GINS. RIBS and SAWS for repairing ALL makes of gins. Send for Price List. Address THE BROWN COTTON GIN CO., Manufacturers of Cotton Gins, Feeders and Condensers. New London, Conn.

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This old-established Foundry and Machine Shop for sale or lease. Has a complete equipment in all departments. Tools for sale. Send for catalogue. Address as above.

FOR RENT.

A valuable mill property located in Philadelphia with business thirty years' established; both Water and Steam Power attached.

Address BOX No. 706,
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SCRAP IRON.

We buy all kinds of Iron and Steel Scrap, Burnt Iron, Old Rails, &c., &c. Write us, naming quantity, price, &c.

ROBINSON & ORR,
115 Water St., Pittsburgh, Pa.
(ESTABLISHED 1859.)

A Leading Manufacturing Concern

is desirous to open a branch house in Chicago, in connection with one or two other reliable Eastern firms who may want to be similarly represented, having one representative, and dividing expense of the undertaking pro rata.

Address "ENQUIRER,"
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TO MANUFACTURERS.—The following rare chance is offered for sale or rent: 24 acres of Land situate at Millersburg, Pa., on the line of the Northern Central Railroad, and bounded on the east by said railroad, and on the west by the Susquehanna River, having thereon erected a Wood-Work Shop, 40 x 74, with Machinery, Shafting, Belting, Pulleys, &c; a Machine Shop, 17 x 21, with Machinery, Shafting, Pulleys, &c; a Smith Shop, 40 x 60, with 10 Fires, Blower, Pipes, &c; a Foundry, 40 x 60, with Cupola House, 16 x 20, with Cupola Blower, Pipe, &c; a Brick Engine and Boiler House, 18 x 38, with brick stack, 35 H.-P. Engine, 40 H.-P. Flue Boiler, &c., and a private siding connecting buildings with N. C. R. R. The above plant is entirely new, just completed and ready for operation, is centrally located, and has all the facilities for receiving and shipping. Should the same remain unsold or not leased, we offer special terms to a competent man who will invest $3000, and take charge of the above works. For further particulars address,

MILLERSBURG MFG CO., Box 143,
Millersburg, Dauphin Co., Pa.

Wanted to buy Hardware Business.

A young man with capital and 12 years' experience in Hardware desires to purchase a third or half interest in an established Hardware business. Reference A No. 1. Communications confidential. Address SAML. W. FLOYD,
Hamilton, Ohio.

60-Inch Pulley Lathe Wanted.

One Pulley Lathe to bore and turn Pulleys up to 60 inches in Diameter. Second hand Lathe preferred. SHERMAN MFG. CO.,
Jackson, Tenn.

TO MAKE room for larger tool, will sell cheap for cash, a Planer, 42 in. x 42 in. x 12 ft.; in good order. Address P. O. BOX 2085,
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Special Notices.

Second-hand Machinery For Sale.

One Engine Lathe, 16 ft. bed, 48 in. swing. Bement's make.
One 20-ft. bed 96 in. Chucking and Boring Lathe.
Two Engine Lathes, 87 in. swing, 20 ft. 6 in. bed, Geared in Face Plate, Screw Feed, Compound Rest.
One Iron Planer, planes 24 ft. long, 62 in. x 62 in. Excellent condition.
One Iron Planer, planes 12 ft. long, 78 in. x 72 in. Bement's make.
One Iron Planer, planes 10 ft. long, 60 in. x 60 in. Bement's make.
One Iron Planer, planes 8 ft. long, 30 in. x 30 in.
One Iron Planer, planes 7 ft. long, 24 in. wide.
Three Iron Planers plane 4 ft. long 24 in. x 24 in.
Three " " 5 ft. long 20 in. x 20 in.
One 1750-lb. Bement Steam Hammer. Excellent.
One 5-foot Radial Drill.
One 40-inch B. G. S. F. Upright Drill. N. Y. Steam Engine Co.'s make.
Two Slotting Machines, 6-in. stroke. Bement's make.
One 10-inch Shaping Machine.
One Axle Lathe, for car axles.
Two Durrell's 7 Spindle Nut Tappers.
Send for lists New and Second-hand Tools, too long for publication.

The GEO. PLACE MACHINERY CO.,
121 Chambers and 103 Reade Streets,
NEW YORK.

SECOND-HAND MACHINERY
IN GOOD ORDER.

One 20 x 48 Corliss Engine.
One 18 x 36 Hor. Engine, built by Jacob Navler.
One 14 x 16 Vertical Engine, New York Safety Steam Power Co.
One 14 x 20 Hor. Engine, Campbell & Rickards.
One 12 x 42 Corliss Engine.
One 12 x 15, Supplee Engine Co.
One 8 x 16 Porter Engine.
One 8 H.-P. Shapley Engine and Boiler.
One 6 " Baxter Engine.
One 50 " Vertical Tubular Boiler.
One 50 " Locomotive Boiler.
One 60 " Hor. Tubular Boiler.
One 40 " Hor. Tubular Boiler.
One 16 x 6 Harrington Lathe.
One 17 x 6 New Haven Lathe.
One 16 x 6 Hartford Engine Lathe.
One 26 x 12 Engine Lathe, New Haven.
One 38-inch swing Column Drill. New Haven.
One 50 inch Vertical Boring Mill.
Also complete outfit for a Sash and Door Factory, including Planers, Moulding Machines, Band Saws, Tenoning Machines, Upright Moulding Machines, Scroll Saws, Mortiser Saw Benches, &c., all modern Tools, but little used.

HENRY I. SNELL
135 North 3d Street, Philadelphia, Pa

E's and B's.

The largest and most reliable stock of Engines and Boilers in America. All sizes and styles, and all made of the very best material at lower prices than common, cheap country-made work can be sold. These Engines are all made interchangeable by special machinery. Agents wanted, and orders from the Trade solicited.

Write for Illustrated Catalogue and particulars.

H. M. SCIPLE,
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HOISTING ENGINES.

New 10 H.-P. worm-geared Hoisting Engines; Steam Cylinder 6 in. bore, 8 in. stroke; geared 16 to 1; Drum 20 in. diameter, 18 in. long. Improved Cone Friction for Hoisting and Lowering. Also 6 in. x 6 in. Williamson Spur-Geared Hoister, with Clutch and Link Motion. Drum 8 in. x 16 in.
A. G. BROOKS,
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FOR RENT.

At New Haven, Conn., first and second story of brick building suitable for Machine Shop or manufacture of Light Hardware; one room 35 x 65, other 35 x 75; well lighted; with 6 to 9 horse steam-power available. The building is connected with a Malleable and Gray Iron Foundry, from which considerable work could be secured. Low price given to good occupant. For further particulars apply to THE G. F. WARNER MFG. CO.,
212 East St., New Haven, Conn.

Plant of Axle Machinery For Sale.

The Machinery and Tools complete for making 100 sets of axles per day, employing about 20 men, recently used by R. Cook & Sons. It is an unusual chance to engage in the Axle business for a small sum of money.
Address HIRAM P. LAWRENCE, Trustee,
Winsted, Conn.

Traveling Salesman Wanted.

A *competent, energetic and pushing Salesman*, to sell goods well known to the Hardware trade; must be familiar with the Hardware business, and experienced in selling goods on the road; liberal arrangements will be made with the right party. Address "M. D. & Co.,"
Office of *The Iron Age*, 83 Reade St., New York.

WANTED

by the Hudson River Ore and Iron Co., a thoroughly competent and practical Chemist who is conversant with Iron Ores. Address, giving references, and stating salary expected,
J. N. STOWER, Superintendent,
Burden, N. Y.

Wanted.

A man thoroughly competent to construct and operate a Mill for the manufacture of Wrought Iron Pipe of all sizes. Address, with references,
BOX 265, Pittsburgh, Pa.

A GENTLEMAN at present traveling the Southern States in the interest of a Machinist, Mill and Railroad Supply house, desires to make a change. Satisfactory reason given. Also acquainted with the Plumbing trade. Address "EDEN," Office of *The Iron Age*, 83 Reade St., N. Y.

A COMPETENT, thoroughly posted Salesman having both road and house experience desires engagement for 1886.
Best references.
Address "COMPETENT," Box 333,
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LAMBERSON'S
HARDWARE PRICE BOOKS,
LARGE SIZE.

500 Pages, 6 x 10½ inches. Revised and improved.

PERFECTION ATTAINED.

Alphabetical Arrangement. Leather Tab Index. Flexible Leather. Rounded Corners.

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POCKET EDITION. FLEXIBLE LEATHER,

With Flap. 250 pages, 4 x 7. Each $4.00.

Discount Book. Cloth, $2.50. Leather, $3.00.

Sent, postpaid, to any address, on receipt of price, by **B. LAMBERSON,** Portland Oregon; David Williams, 83 Reade St., New York; A. F. Shapleigh & Cantwell Hdw. Co., t. Louis, Mo., or William Blair & Co., Chicago, Ill.

ENGINES & BOILERS.
NEW AND SECOND-HAND.

The following new Slide Valve Engines guaranteed complete and first class:

One 18 x 24.	One 10 x 12.
One 10 x 24.	One 8 x 12.
One 12 x 16.	One 8 x 10.
One 10 x 15.	One 7 x 9.

Also One 12 x 30 Corliss Engine. New.
One 14 x 24 Adjustable Cut-Off Engine. New.
Also the following, Second-hand, guaranteed in good condition:
One Corliss Cut-Off, 18 x 42.
One " " 14 x 48.
Two Wright " 22 x 42.
One " " 18 x 32.
One Vertical Safety Power, 14 x 16.
One " " " 5½ x 7.
One Corliss Beam Condensing Engine, 500 H.-P.
One 16 x 48 Adjustable Cut-Off.
One 10 x 30 " "
One 12 x 24 Plain Slide Valve.
One 10 x 20 " "
Two 9 x 21 " "
One 10 x 15 " "
Large stock assorted sizes new and latest improved Engines and Boilers. Plans, estimates and specifications furnished for Mills and Factories. Send for Circulars and Catalogues.

THE NEWELL UNIVERSAL MILL CO.,
10 Barclay Street, New York.

METALLURGICAL ENGINEERING.

I am prepared to furnish

PLANS, SPECIFICATIONS and ESTIMATES

AND TO

SUPERINTEND THE CONSTRUCTION OF ROLLING MILLS AND MACHINERY, REGENERATIVE GAS FURNACES, TUBE AND PIPE MILLS, ETC., ETC.

I represent the latest improvements in all the above branches.

M. V. SMITH, Metallurgical Engineer,
Room 56, Lewis Block, Pittsburgh, Pa.

For Sale.

Second-hand

DROPS and LIFTERS.

BEECHER & PECK,
Lock Box 122, New Haven, Conn.

"Valuable Iron Mine" For Sale.

A tract facing on two railroads. Contains 10,000 acres of timber. Correspondence solicited.
DULANY & WHITING,
1320 F Street, N. W., Washington, D. C.

FOR SALE, MACHINERY.

Planer, 24 in. x 24 in., to plane 6 ft. New. $375.
" 27 in. x 26 in. " 8 ft. " $600.
Lathe, 18 in. x 6 ft. $156. 16 in. x 6 ft. ditto. $120. 2d-hd.
Fox Lathe, with Turret for brasswork. New. $400.
Fuley Lathe, 36 in. x 19 ft., with Boring Attm't. $950.
New Speed Lathes. Heavy. $45, $50, $66, $75.
Back Geared Drill Press. New. 26-in. swing. Modern style. $175.
Rapid Nut Tapper. Heavy. 4 spindles. $100.
Improved Nut Machine, for 1-in Nuts and under. $500.
Ten large Improved Portable Forges at $10.
YORK & BENTON, Cleveland, Ohio.

A. J. Sweeney & Son,
WHEELING, W. VA.,

Solicit correspondence with parties desiring Machinery, &c. Complete outfits for Nail Factories and Rolling Mills.

Wanted to Buy.

Old Iron and Steel Wire Rope, Burnt Iron &c.
Address, stating price, quantity, &c.
SITES, GILL & CO.,
222 and 224 So. Third Street,
Philadelphia, Pa.

Malleable Iron Plant for Lease at Youngstown, Ohio.

The property is well located on or near several lines of railroads and is one of the best shipping points in the State. Brick buildings equipped with all machinery necessary for the manufacture of malleables. Foundry 75 x 200 and 75 x 100. Engines in first-class condition. Property could be utilized for other manufacturing purposes with small outlay, and will be leased on reasonable terms. For further particulars, address MALLEABLE IRON WORKS,
Youngstown, O., Care A. H. RICE.

For Rent.

FACING MILL, consisting of a run of six Mills (lower runners), Machinery Appertaining, in complete order, and supplying the trade daily. Further information inquire of
E. S. HERANCOURT,
Kindel and Central Aves., Cincinnati, O.

A Traveling Salesman of many years' experience would like to form an outside connection with small manufacterer of saleable patented novelties. Address "M. W. R.,"
Office of *The Iron Age*, 83 Reade St., New York.

NOTICE.

Large Buyers of Shafting are requested to send specification for special prices.
MERWIN McKAIG,
Cumberland, Md.

Trade Report.

British Iron and Metal Markets.

[*Special Cable Dispatch to The Iron Age.*]

LONDON, WEDNESDAY, December 23, 1885.

Scotch Pig.—The market is not so steady. We quote makers' brands as follows:

Coltness, alongside, Glasgow		50/
Langloan,	" "	47/
Gartsherrie,	" "	45/6
Summerlee,	" "	50/6
Carnbroe,	" "	45/
Glengarnock,	" Ardrossan	46/6
Eglinton,	" "	42/6
Dalmellington,	" "	44/6
Shotts,	" at Leith	47/

Lighterage from Ardrossan to Glasgow is 1/ ₱ ton.

Cleveland Pig.—The market is weaker. We continue quotations, f.o.b. shipping ports:

Middlesboro,	No. 1 Foundry	37/
"	No. 2 "	36/
"	No. 3 "	33/ @ 33/6
"	No. 4 Forge	32/

Bessemer Pig.—The market is unchanged. W. C. Hematites are quoted 45/ for mixed lots, Nos. 1, 2 and 3, equal portions, f.o.b. shipping ports.

Manufactured Iron.—The market is irregular. We quote at works:

		£	s.	d.	£	s.	d.
Staff. Ord.	Marked Bars	7	10	0	@	.....	
"	Medium "	6	0	0	@	6 10	0
"	Common "	5	10	0	@	5 15	0
Hoops, 20 W. G. and over.							
"	Common Best	6	15	0	@	.....	
"	Medium	6	5	0	@	6 10	0
"	Common	6	0	0	@	6 7	6
Sheets, 20 W. G. and under.							
"	Ordinary Best	7	15	0	@	8 5	0
"	Common	7	5	0	@	7 15	0

Steel Rails—Are a little steadier. We quote £4. 15/ @ £4. 17/6, f.o.b. shipping ports.

Old Rails.—Market is a little firmer. We quote Old D. H's, c.i.f. New York, £3. 2/6 @ £3. 7/6.

Bessemer Crop Ends.—Run of mill, 54/ @ 56/.

Scrap.—The market is a little firmer. We quote Heavy Wrought £2. 12/6 @ £2. 17/6, c.i.f. New York.

Copper.—The market is weaker. We quote Best Selected, £45 @ £46, and Chili Bars, £40. 15/ @ £41. 5/.

Tin.—The market is not so steady. Straits Tin, spot, is quoted £92. 15/ @ £93. 5/, and futures £93. 5/ @ £93. 15/.

Tin Plates.—The market is not so steady. We quote:

Tin Plates, 10x14,	1st qual.	Charcoal	19/6 @ 21/6
" "	2d "	"	18/6 @ 19/
" "	1st "	Coke	17/6 @ 18/
" "	2d "	"	14/6 @ 15/

Spelter.—The market is unchanged. We quote Ordinary at shipping ports, £14. 15/ @ £14. 17/6.

Lead—Market unchanged. We quote Common English Pig, £12. 10/ @ £12. 15/.

Freights.—Steam from Glasgow to New York, 5/ @ 7/.

Financial.

Office of *The Iron Age*,
WEDNESDAY EVENING, December 23, 1885.

In a review of the week the salient event is a rapid advance in the price of sterling exchange, until now there is a profit in exporting gold, and, unless there is an early free outward movement in grain and merchandise, gold shipments may be looked for on a liberal scale. The advance was in four successive stages, so that the posted rate is now $4.86½ @ $4.90½, and it is reported that about $1,400,000 gold has been engaged for shipment by the Oregon, sailing on Saturday. The movement is stimulated by an advance in the discount rate of the Bank of England to 4 %, with the object of checking the continued outflow to Germany. Commercial bills continue scarce in this market on account of the light export demand. It is significant of the prevailing distrust touching the silver question that the leading wholesale houses in the metal and iron trades are generally adopting gold clauses in all of their contracts. After being in session for more than two weeks Congress adjourns for the holidays without indicating in any way the feeling of either House on any question important to the financial or commercial interests of the country.

The Stock Exchange markets during the week have been irregular, but, as a whole, tending to a lower basis. A fall on Wednesday was attributed to bear raids. The report of the appointment of a receiver for Texas Pacific was confirmed. On Friday prices varied within narrow limits, but generally were higher. Western Union sold freely on the report of a seizure and intended sale of the effects of the company to satisfy the city's claim for taxes, the company resisting on the ground that the same property is taxed in other States. On Saturday the market was dull and lower, and on Monday there was a further decline. On Tuesday an advance in the rate for sterling and engagements of gold for export had an unsettling effect. Today it was understood that the profits in gold shipments were merely fractional, and prices rallied ⅛¢ @ ¼¢, compared with the previous closing. Quotations as follows: Burlington and Quincy, 135⅝; Canadian Pacific, 58½; Lackawanna, 126⅞; Erie, 23⅛; Kansas and Texas, 31⅜; Lake Shore, 84⅝; Louisville, 43⅝; Missouri Pacific, 107; New York Central, 102¼; New York and New England, 37¼; Jersey Central, 43; Northwestern, 106; Northern Pacific preferred, 59⅛; Oregon Railway and Navigation, 106; Oregon and Transcontinental, 31¾; Pacific Mail, 64; St. Paul, 92; Omaha preferred, 102; Union Pacific, 53¼; Western Union, 72; Delaware and Hudson, 94¼; Michigan Central, 71¾; Manhattan, 120¼; Northern Pacific, 27; Reading, 20; Rock Island, 127½; Manitoba, 107; Texas and Pacific, 11⅝.

United States bonds closed as follows:

	Bid.	Asked.
U. S. 3 per cents	104¼	104½
U. S. 4½s, 1891, coupon	112¼	112¾
U. S. 4s, 1907, coupon	124½	124¾
U. S. Currency 6s, 1895	125¾	—
U. S. Currency 6s, 1896	128	—
U. S. Currency 6s, 1897	130½	—
U. S. Currency 6s, 1898	132⅞	—
U. S. Currency 6s, 1899	134½	—

As regards general trade, while there is nothing discouraging in the outlook, it is conceded that the business current is sluggish. The improvement in iron is remarked upon as a harbinger of brighter days, but in grain and cotton there is as yet no change for the better, speculation operating as a check to legitimate transactions. Compared with one week ago wheat is about 2¢ @ 3¢ ₱ bushel lower, and corn is lower in sympathy, but without the effect of enlarging the volume of sales. In dry goods jobbers report a tolerably active business, mainly on spring contracts. A goodly number of buyers are seen in the market, giving promise of a very satisfactory close of the year. Forwardings have been hastened to take advantage of contracts for freight which expire December 31. Among the coal operators prospects are clouded by want of co-operation and consequent irregular prices for the output, with no certainty that restriction can be enforced. Reading cannot outline its policy until the question of President Gowen's election is decided, three weeks hence.

The total clearing-house exchanges of leading cities last week show an increase of 36 %, compared with last year. Outside of New York, increase, 17½ %. New York gained 46; Boston, 23; Philadelphia, 10; Chicago, 16; St. Louis, 6½; Detroit, 50; St. Joseph, 75, and Springfield, 48½ %. But four cities report losses. The exhibit shows a large gain both over last week and the corresponding week of last year. There is also evidence of more activity in manufacturing centers.

The weekly statement of the Associated Banks showed a decrease of $1,810,550 in surplus reserve, that item now standing at $26,747,800, in comparison with $10,686,625 this time last year. The fall in reserve was chiefly owing to a loss of $1,201,400 specie. In all items there were declines, the loans contracting $1,152,500. Money is easy, with abundant offerings of capital from estates and institutions at low rates of interest. Bankers' balances average about 2 %. The volume of available funds will be augmented by the January disbursements to the estimated amount of $60,000,000. Some effect is already observable in the inquiry for bonds for purposes of investment. Commercial paper is scarce. We quote 60 to 90 days' indorsed bills receivable at 4 @ 4½ %; four months' acceptances, 4½ @ 5 %.

The Produce Exchange has resolved to close on Saturday next as well as Christmas Day. The Cotton and Coffee Exchanges have agreed to close on Saturday and Saturday week, as well as the legal holiday previous to those two days. The action of the Stock Exchange is in doubt.

An important suggestion is put forward at a critical juncture, namely, that the cancellation of $45,000,000 of the gold and silver certificates now held in the Treasury would be a full compliance with the sinking fund law, and would do away with the obligation to call bonds, so far as the sinking fund is concerned. The authority for such a course is said to be found in the provision that the Secretary of the Treasury may exercise his discretion as to the form of indebtedness—interest bearing or non interest bearing—which shall be retired. A Washington correspondent says: "The cancellation of $15,000,000 of gold certificates in the Treasury would not do away with the necessity for paying out that amount on bond calls, but would increase the Treasury fund of free gold to that extent. This project, if proved to be sound, would be regarded as the strongest weapon wielded by the Government against the silver men. It would postpone what they seek to accomplish, remove many of their inducements and motives, and perhaps play an important part in forcing a compromise. It is said upon good authority that Speaker Carlisle will fill the vacancies upon the Coinage Committee with Members who will report a bill to suspend the coinage of the silver dollar; but it is not likely that any one but Mr. Bland will be made chairman of that committee."

The exports of merchandise from this port during the week were $15,000 below those of the previous week, the total valuation being $6,444,818, making the aggregate since January 1 $323,177,881, as compared with $321,686,622 for the corresponding time in 1884. Included were 107,692 bushels of wheat, 736,316 bushels of corn and 21,612 bales of cotton. The imports of merchandise at this port during the week were $1,143,866 below those of the previous week, the total valuation being $6,401,430, of which $1,500,000 represents dry goods. The total since January 1 is $378,456,289, as against $410,605,752 for the same time last year.

According to the Custom-House reports, the imports of specie and bullion at this port last week were $875,582, mostly from Bremen and Havre, making a total of $16,360,628, since January 1, as compared with $26,242,142 for the same time in 1884. The exports for the week were $816,138, mostly to Havana, making a total $23,461,276 since January 1.

The West Shore $50,000,000 mortgage was given to the Union Trust Co. to secure 4 % bonds of an equal amount maturing many years hence. Winslow, Lanier & Co. were the successful bidders for $6,000,000 West Shore first morgage bond certificates, at $98.26. The West Shore officials declare all special rates of freight off after January 1, and order an immediate advance. The receivership of the New York and New England Railroad has been dissolved.

An offer of 50¢ on the dollar by the Commercial Warehouse Co., which failed, say, 18 months ago, was ratified by the stockholders. The liabilities were $1,500,000.

The City Bank of Houston, Tex., one of the oldest financial institutions in that city, closed its doors 19th inst., and will go into the hands of a receiver; liabilities, $1,000,000.

St. Louis.

W. H. SHIELDS, 305 Olive street, St Louis, reports, under date of December 21: Prices are held firm here all along the line, with a disposition to sell for immediate delivery and in small lots only:

CHARCOAL FOUNDRY.	
Missouri	$16.00 @ $18.00
Southern	18.00 @ 19.00
COAL AND COKE FOUNDRY.	
Missouri	15.00 @ 18.00
Southern	17.50 @ 18.50
American Scotch	19.00 @ 20.00
MILL IRON.	
Missouri	16.00 @ 17.00
Southern	16.00 @ 16.50
CAR-WHEEL AND MALLEABLE IRONS.	
Southern	20.00 @ 24.00
Lake Superior	20.00 @ 22.00
SCRAP, ETC.	
Old Rails	20.00 @ 21.00
Old Wheels	15.00 @ 16.00
Connellsville Coke (East St. Louis)	5.30 @ . . . .

Detroit.

CHARLES HIMROD & CO., dealers in Pig Iron, Detroit, Mich., report, under date of December 21, as follows: Since our last report, when we noted that the demand had increased for all grades of Pig Iron except Lake Superior Charcoal, we have changed our views. The demand for a better class of material came in like a cyclone last week. Prices naturally advanced quickly, and it can safely be said to be worth from $2 to $3 more than a week ago, and this was a very just advance, inasmuch as Charcoal Iron did only but reach its correct relative position to other grades of Pig Iron. The deals were very large, and prices were firmly maintained, and at this writing can be said to be even more firmly established. There were also some pretty large deals in Southern and Ohio Irons at advanced prices. The trade may recollect a little book published by us entitled "Is Benner a Prophet?" and, in looking over this pamphlet again, one must conclude that he is not, at least in this instance. Our computations made there seem about to be fulfilled. The demand for Old Wheels and Rails kept increasing and prices rising during the week, and we are again compelled to change our quotations to a higher basis, which we are glad to say we are perfectly willing to do. For round lots on four months' time we present the following:

Lake Superior Charcoal, Nos. 1, 2 and 3	$21.00 @ $23.00
Lake Superior Charcoal, Nos. 4, 5 and 6	22.00 @ 24.00
Lake Superior Coke, All Ore	20.50 @ 21.50
Lake Superior Coke, Cinder Mixed	19.00 @ 20.00
Standard Ohio Blackband	20.50 @ 21.50
Southern No. 2	19.00 @ 19.50
Southern Silvery, Open	17.50 @ 18.00
Southern Silvery, Close	17.00 @ 17.50
No. 1 Southern Mill	17.00 @ 18.00
American Old Iron Rails	20.00 @ 21.00
Old Wheels	18.00 @ 19.00

The proposed subsidy to the Eads Ship Railway Co. amounts to a guarantee of two-thirds of its estimated revenue for 15 years, Mexico having already guaranteed the other third. If money should be advanced under this guarantee the company is required to pay it. The cost to the Government, if all should go well, would be nothing; but if the project should be an engineering failure, or if the company should fail to earn anything or repay any of the advances, the United States might be called upon for $2,500,000 per annum for 15 years, or $45,000,000 in all. This is the extreme limit of liability, to be lessened by two-thirds of the net earnings, whatever they may be.

Dr. Ferdinand C. Valentine has been appointed Consul-General of the Guatemalan Government to succeed Mr. Jacob Baiz, who has represented Guatemala at this port for 12 years past, latterly representing also the Republics of Honduras and San Salvador. Dr. Valentine is an American citizen of German birth, and for two years past has been the editor of *El Latin Americano*, a literary magazine in the Spanish language. The consulate will be removed to spacious offices in the Produce Exchange Building, where a permanent exhibit of Guatemalan products and manufactures will be opened to diffuse an increased knowledge of the country and the opportunities it offers to American commercial enterprise.

In reference to certain allegations affecting the business standing of the firm of Wm. R. Grace & Co., one of whose partners was Chilean consul in New York, and who lost heavily by the capture of the nitrate beds, Mr. Grace says their claims against the Chilean Government have been presented, and that the standing of the firm in Chili, as it has always been in Peru, is at the top of the list of American houses, both with the Government and the citizens, and it is a well-known fact that their house has done more to increase the commercial relations between these countries and the United States than any other means that have ever been taken.

It is reported that the Lake Shore Railroad have bought 1000 tons of steel axles.

Trade Report.

New York Iron Market.

American Pig.—As yet the Thomas Iron Co. have not announced their prices for the coming year. It is reported, however, that some orders have been booked by furnace companies for Foundry Irons at old quotations. The market is quiet and firm, with only a small current business doing, though there is the prospect that considerable quantities will be placed as soon as prices have been determined upon. We quote standard brands of Lehigh and North River Irons, tidewater delivery, nominally as follows: No. 1 X Foundry, $18 @ $18.50; No. 2 X Foundry, $16 @ $16.50; Gray Forge, $15.50. Outside brands sell for 50¢ @ 75¢ less than our quotations. The Chickies Iron Co. quote for Chickies Pig Iron, delivered to boats or on cars at Chickies, $19 for No. 1, $18 for No. 2 and $17 for Gray Forge.

Scotch Pig.—The advance in freights and the impossibility to obtain any corresponding advance here, while American Iron remains unchanged, are creating a dull market. It is noted that Ohio American Scotch has during the current year penetrated a good deal further East, and it is very well spoken of by consumers who have used it. We quote nominally as follows for small lots: Coltness, $20.50 @ $21 to arrive; Gartsherrie, $20 @ $20.50 to arrive; Shotts, $20.50 @ $21 to arrive; Carnbroe and Glengarnock, $19.50 to arrive; Summerlee, $20 @ $20.50 to arrive; Dalmellington, $19 @ $19.50 to arrive; Eglinton, $18 @ $18.50 to arrive, and Clyde, $18.50 @ $19 to arrive.

Bessemer Pig.—There has been considerable activity, notably in special brands for Open-Hearth Steel purposes, round blocks having sold at private terms. It is reported that round lots of English Bessemer bought for American account have been resold in England at the advance precipitated by the appearance of buyers from this side. We learn that a lot of 5000 tons of Viscaya Bessemer Pig has been bought for American account at $4.25, f.o.b Bilboa, Spain, with the option of increasing to 30,000 tons. Buyers here are unwilling to pay more than $20 here, while holders ask $20.50 @ $21 for ordinary West Coast Hematite. There is a wide diversity of opinion as to the probable requirements of the Rail mills during the coming year. All but possibly one or two of the mills seem to have covered requirements, and the future will depend upon the magnitude of the sales of Rails for summer and fall delivery.

Spiegeleisen.—There has been some business at private terms. We quote $28 for 20 % English, which may be shaded, and $67 for 80 % Ferromanganese.

Bar Iron.—A slightly better tone prevails. Some of the mills are not anxious to book orders for January; others are inclined to accept bids at an advance of 0.05¢ for January, an additional 0.05¢ for February and an equal amount for March delivery. We quote for delivery here in round lots: Common Iron, 1.47¢ @ 1.55¢; Medium, 1.55¢ @ 1.7¢, and Refined Iron, 1.75¢ @ 1.9¢, with half extras. Steel, 1.85¢ @ 2.10¢ base, according to quality. Store prices are 1.6¢ @ 1.75¢ for Common, 1.75¢ @ 1.8¢ for Medium, and 1.9¢ @ 2¢ for Refined.

Structural Iron.—There is a disposition to ask slightly higher prices, and it is noted that there are inquiries for round lots in the market. We quote Angles 1.95¢ @ 2¢, delivered, and Tees at 2.25¢ @ 2.35¢ for round lots. Steel Angles are quoted 2.35¢ @ 2.45¢, according to quality. Store quotations remain 2.2¢ @ 2.4¢ for Angles, and 2.5¢ @ 2.7¢ for Tees. American Beams and Channels are 3¢ base from dock for all orders. It is reported that another of the large Pennsylvania Steel works is preparing to go into the manufacture of Steel Beams.

Plates.—The feeling is a little better. We quote for round lots: Common or Tank, 2¢ @ 2.1¢; Refined, 2¼¢ @ 2⅜¢; Shell, 2.4¢ @ 2½¢; Flange, 3.4¢ @ 3½¢; Extra Flange, 4¢ @ 4¼¢. For small lots of Steel Plates the quotations are as follows: Ship, 3¢ on dock; Tank, 2½¢ on dock; Boiler, 3¢ @ 3¼¢ for Shell, 3½¢ @ 4¢ for Flange, and 4¢ @ 5½¢ for Extra Flange and Fire-Box.

Merchant Steel.—Quotations for the range from ordinary to good grades are as follows: American Tool Steel, 7½¢ @ 10¢; Tool Steel of special grades and finer qualities, 12¢ @ 20¢; English Tool, 13½¢ @ 15½¢; Common grades, 7¢ @ 9¢; Crucible Machinery, 4.5¢ @ 6¢; Spring and Tire, 2⅝¢ @ 2¾¢; Open-Hearth Machinery, 2½¢ @ 2¾¢, and Bessemer Machinery, 2¢ @ 2½¢. The committee of the Steel Association will meet at an early date to complete the details for the organization.

Steel Rails.—Beyond one lot of 5000 tons and an increase in a former order from 5000 to 7500 tons we hear of little business done by the Eastern mills. The Cleveland Rolling Mill Co. have advanced their price to $36.50 from $35.50. Some of the Eastern mills ask $35, but we hear of a bid of $35.50 for a 1000-ton lot at tidewater, spring delivery, and for suitable deliveries $34 would be readily accepted. The conviction appears to be gaining ground among the mills that sound policy dictates that to avoid the growth of a feeling of hostility on the part of the railroads it becomes a part of the policy of the combination to promptly increase the allotment should the demand overtake the present capacity, limited by agreement. Present prices, while they are fairly remunerative to the mills, are by no means extortionate. It is well known that leading buyers have expressed their conviction to that effect. But they appear to be somewhat uneasy that the combination might abuse its power, and so shape its policy that considerably higher prices might become unavoidable. Leading men identified with the industry are inclined to give strong assurance on that point. It would certainly be a wise step on the part of the combination to commit itself to such a policy of maintaining values at a fair level, with the proviso, of course, that they be based on the present scale of wages and cost of raw material. It would destroy the sympathy which appeals against a combination always carry with them, even if it has been formed simply to put an end to heavy losses on the part of all producers and is not handled in a manner to do injury to consumers. Thus far the efforts of a few railroad men to foster a feeling of hostility on the part of the latter are not serious, but it is argued that any additional heavy advance might lead to its gathering dangerous strength. The Rail mills have acted with discretion thus far, and the feeling we allude to is a strong indication that they will do so in the future. There are a few large inquiries still in the market, among them one of 10,000 tons for the Union Pacific and one of about 6000 tons for a new Alabama road.

Steel Wire Rods.—Some sales of round lots are reported this week. We quote $42 @ $42.50.

Old Rails.—Only a few small transactions are reported at $20, which it appears buyers had to pay to cover urgent requirements. Some sellers are asking as high as $21, but consumers are far from having reached that point, and rarely go above $19 @ $19.50. We hear of one sale of 1000 tons delivered at an Eastern Pennsylvania mill at $21.25. A number of leading consumers here, in Eastern Pennsylvania, in Virginia and at Pittsburgh are reported to be well supplied till next spring.

Crop Ends.—Some lots of Continental and West Coast Crop Ends have been placed, the former at $21.

Scrap.—Holders ask $20, buyers bid $19. No business of any consequence has been done.

Rail Fastenings.—We quote 2.25¢ for Spikes, 2.75¢ for Bolts and Square Nuts, 2.9¢ @ 3¢ for Bolts and Hexagon Nuts, and 1.7¢ @ 1.75¢ for Splice Bars.

Metal Exchange.

The following transactions have been reported at the Metal Exchange:

THURSDAY, December 17.

35 tons Tin, March..... 20.50¢
5 tons Tin, February..... 20.55¢

SATURDAY, December 19.

500 tons Pig Iron Certificates, April..... $17.62½

MONDAY, December 21.

25,000 ℔ Lake Copper, March..... 11½¢

TUESDAY, December 22.

300 tons Pig Iron Certificates, March..... $17.75
500 tons Pig Iron Certificates, April..... $17.87½
25 tons Chili Bars..... £41. 15/

Philadelphia.

Office of *The Iron Age*, 220 South Fourth St.,
PHILADELPHIA, December 22, 1885.

Pig Iron.—The market shows continued firmness, and is apparently getting into shape for a general revision of prices. Sales late last week were made on the basis of $15.75 at tide for standard brands of Gray Forge, and $18 for No. 1 Foundry, and, while there is no official announcement of any advance, it is very doubtful if orders to any amount could be placed at these figures. As a matter of fact, there is no uniformity whatever; what may be quoted for one brand is no certain criterion of what others may be held at. A fair average at which orders are entered at to-day would be $16 @ $16.25 for Gray Forge and $18.50 for No. 1, although some quote 50¢ @ $1 more, and here and there possibly some parties might take a little less. It is very clear, however, that the tendency is toward higher figures, and before the close of the year prices are likely to be settled on a firm basis, with $16 as a very inside figure for Gray Forge, and $18.50 for No. 1, with a probability that even these rates will seem low 30 or 60 days hence. It is not easy to give satisfactory reasons for opinions of this kind, but intuitions are sometimes superior to reason, and as the advance so far has been spontaneous and unaided, and seems like continuing, consumers feel that there is no use in trying to resist it. Referring to specie payments, Horace Greeley said: "The way to resume was to resume," a maxim which appears likely to be adopted in the Iron trade, so that the way to advance will be to advance. The weakness in Finished Iron has been thought likely to stand in the way of any further advance in Pig Iron, but there are indications of a movement toward better prices in the finished article, so that argument will not have much force after a while. So far as can be seen there is nothing likely to prevent a moderate upward movement in both Pig and Finished Iron; $20 for No 1 Foundry, and 2¢ for Bar Iron, would be fair prices, considering the enhanced cost of production, and within 60 days it is thought that these figures will be realized. Meanwhile, as already stated, prices are irregular, varying from $16 to $16.50 for Gray Forge and No. 2; $18 to $18.50 for No. 1, and 50¢ @ $1 more for special brands.

Foreign Iron.—There has been no business of any importance within the week, so far as known, prices being considerably beyond buyers' ideas. Bessemer for shipment is nominally about $20.50, and 20 % Spiegel $27.50 @ $28.

Muck Bars.—Prices are firmer and the supply very light. Limited quantities can be had at from $27.50 to $28 at mill, but sellers quote with extreme caution.

Blooms.—There is no change; sales in small lots at about the following figures: Soft Basic Blooms, $32 @ $34; Billets, $37 @ $38, and Siemens-Martin, $40 @ $42; extra quality, $43 @ $45; Domestic Blooms, $30.50 @ $32, delivered, for Nail Plate, and $35 @ $36 for Plate and Sheet Blooms; Charcoal Blooms, $50 @ $52; Run-out Anthracite, $43 @ $44; Scrap Blooms, $32 @ $33; Northern Ore Blooms, $32.

Bar Iron.—At this late season no great activity is expected, but the steady flow of small orders keeps the mills pretty well employed. The outlook for business shows steady improvement; it is several years, in fact, since the year closed, as this is likely to do, with an increasing volume of business and improving prices. No such boom as was experienced in 1880 is either expected or desired, but there is substantial basis for the belief that the shrinkage in process has been reversed, and for a time at least sellers will have some control over quotations. At the moment prices are a little irregular, but it is understood that a movement is on foot to secure firm and slightly higher prices, probably 1.85¢ @ 1.9¢ for Refined Bars, which of late have been selling at 10¢ @ 15¢ less.

Plate and Tank Iron.—The demand shows some improvement, although it cannot be said that there is any great activity at present. A very large amount of work is in sight for spring delivery, however, and in the meantime the mills will have about as much as they can handle until after the holidays. Prices are irregular, but generally a shade dearer, and less disposition to accept orders at the inside figures. Asking prices about as follows: Ordinary Plate, 2¢ @ 2.1¢; Tank, 2.1¢ @ 2.2¢; Shell, 2.5¢; Flange, 3.5¢; Fire-Box, 4.25¢; Steel Plates, Shell, 3.25¢; Flange, 3.5¢; Fire-Box, 4¢.

Structural Iron.—Inquiries for quotations have been made on large quantities, say 15,000 to 20,000 tons of Bridge Iron, besides other work of great importance. Some of the large mills are already pretty well filled up for the spring months, so that orders such as the above ought to impart a strong tone to the market, and doubtless will do so. At no period since 1880 has the outlook been so good and an abundance of work so well assured. Prices are not quotably higher, but are stiffening a little, with the following as the usual asking prices: 2¢ @ 2.05¢ for Angles; 2.1¢ @ 2.2¢ for Bridge Plate; 2.4¢ @ 2.5¢ for Tees, and 3¢ for Beams and Channels.

Sheet Iron.—There is a considerable amount of business doing in a quiet way, and manufacturers will begin the new year with very little stock on hand and some very considerable orders for spring delivery. The tendency is toward higher prices, and a slight advance on current rates may be considered as a settled fact, although official announcement may not be made until after the holidays. Present prices about as follows:

Best Refined, Nos. 26, 27 and 28	4 ¢
Best Refined, Nos. 18 to 25	3¾¢
Common, ¼¢ less than the above.	
Best Bloom Sheets, Nos. 26 to 28	5 ¢
Best Bloom Sheets, Nos. 22 to 25	4¼¢
Best Bloom Sheets, Nos. 16 to 21	4 ¢
Blue Annealed	3 ¢
Best Bloom, Galvanized, discount	57½ %
Common, discount	62½ %

Nails.—The demand, as may be supposed, is not very large at present, nor is it likely to be for some time to come. The firmness in Pig and Finished Iron, however, has a tendency to keep the price of Nails steady, and the break (due to local influences) which appeared imminent a few days ago is believed to have passed away. For the present, therefore, quotations are $2.75, less the usual trade discount.

Steel Rails.—The demand keeps up very fairly, and, with so large an amount of business on hand as most of the mills have, prices are firmly maintained. The usual quotation is $35 at mill, but on large orders and convenient deliveries it is not unlikely that $34.50 or a shade less might be accepted.

Old Rails.—There are no Rails here, and no sales reported for some days. Prices cannot, therefore, be quoted with any degree of accuracy, but buyers intimate that they would pay $20.50 @ $21, Philadelphia, for prompt deliveries.

Scrap Iron.—There is a good demand, and sales are readily made at full prices as quoted herewith: No. 1 Wrought Scrap, $18 @ $19; No. 2 do., $12 @ $13; Horse Shoes, $22 @ $23; Turnings, $13 @ $14; Old Car Wheels, $14.50 @ $15.50; Old Steel Rails, $16; Fish Plates, $22 @ $23; Cast Scrap, $13.50 @ $14; do. Turnings, $10 @ $10.50.

Pittsburgh.

Office of *The Iron Age*, 77 Fourth Avenue,
PITTSBURGH, PA., December 23, 1885.

While we continue to hear a good deal about the hard times, the holiday stores have never done a greater business than during the past few days; the streets have been crowded with purchasers of holiday goods, and it is evident that the masses have more money than was generally supposed. It is a fact that labor, both skilled and unskilled, has been better employed this year than in 1884. The coal miners' and nailers' strikes still continue, but it is confidently expected that the former will soon be brought to a close. The nailers have been idle for almost seven months, and it is evident to impartial observers that as the case now stands the manufacturers have the best of it. The iron and steel workers have had a very good year, but the introduction of natural gas in place of Coal has displaced a great deal of common labor, and the business of teaming about the mills in hauling Coal and ashes has been very much curtailed in consequence. The Coal trade of Pittsburgh continues in an exceedingly unsatisfactory condition; the natural gas has almost ruined our local trade, while the markets below are overstocked, and prices at Cincinnati barely cover actual laid down cost. Even should the operators meet the miners, it would only be for a short time, until some important contracts had been provided for.

Iron Ore.—There is still a good deal of inquiry for desirable Ores, and the market is firm at the recent advance; Bessemer Ores are up about $1 ℔ ton, and ordinary Mill Ores 50¢. Considerable foreign Ore has been bought on Pittsburgh account, and if the home Ores should go much higher the importations of foreign will no doubt increase. Advices from Cleveland report the stock of Lake Ore as rapidly being diminished.

Pig Iron.—We have to report a continued firm, but less active, market, operations being restricted somewhat by the extreme views of furnacemen. As compared with the date of our last report, all descriptions are up from 50¢ to 75¢ ℔ ton. Charcoal Irons are up $1. Even at the advance furnacemen are chary about contracting for future delivery, and it is not strange in view of the sharp advance in Ore and a probability of the cost of freights and Coke being increased. Consumers, on the other hand, are timid about meeting the views of producers. One strong argument advanced by the former is that as yet there has been little or no advance in finished goods, and they are not fully satisfied that the demand will be sufficient to sustain higher prices. Then it is known that a good many idle furnaces are making preparations to blow in, and it is expected that the production will be considerably increased within the next 30 days. In view of the above it is not strange that thoughtful and conservative operators are somewhat apprehensive; they think that possibly the advance has been greater than the actual condition of affairs justifies, and that there may be a reaction. The furnaceman is in a quandary, not knowing whether to sell or hold on, and the same is true of the consumer. We quote prices as follows:

No. 1 Neutral Forge	$15.75 @	$16.00,	4 mos.
No. 2 Neutral Forge	15.00 @	15.25,	4 "
All-Ore Mill	16.25 @	17.00,	4 "
White and Mottled	14.50 @	14.75,	4 "
No. 1 Foundry	18.00 @	18.50,	4 "
No. 2 Foundry	16.75 @	17.00,	4 "
Charcoal Foundry	21.00 @	23.00,	4 "
Car-Wheel Charcoal	25.00 @	27.00,	4 "
Bessemer Iron	20.50 @	21.00,	4 "

Muck Bar—Is considerably firmer, in sympathy with Pig Iron, and it is expected that there will be an increased demand within the next few weeks, as Muck is cheaper relatively than Pig Iron. In the absence of sales we quote nominally at $26.50 @ $27, cash.

Manufactured Iron.—There is an increased inquiry, especially for future delivery, and it is evident that both jobbers and consumers are apprehensive of higher prices, which must come before long if the advance in the raw material is maintained. Consumers of Old Rails have to pay an advance of $4 @ $5 ℔ ton, as compared with two or three months ago, and Pig Iron is up from $1.50 to $1.75, as compared with the lowest point. While manufacturers are still supplying immediate wants of customers at prices quoted, it is doubtful whether they would be willing to contract ahead except at an advance. We continue to quote on a basis of 1.65¢ @ 1.75¢ rates for Bars, 60 days, 2 % off for cash.

Nails.—We continue to quote in a jobbing way at $2.70 @ $2.75, 60 days, 2 % off for cash. There is not much inquiry. According to the report of the secretary of the Western Nail Association there are now almost 700 machines in operation non-union, and the outlook for the strikers is not promising. The rumors published in some of the dailies last week that certain manufacturers were anxious for a compromise had no foundation whatever and were evidently gotten up for effect. Business is likely to continue dull until the spring trade opens, and manufacturers are in no hurry about starting up at present.

Wrought-Iron Pipe.—There was a meeting of the Wrought-Iron Pipe manufacturers in New York last week, but about the only thing done was to reaffirm former prices. The mills still have all they can do, notwithstanding there is not so much new business offering. Rumors prevail that the Standard Oil Co. either have made or are about to make large contracts, but whether these rumors have any foundation or not has not yet been developed. Prices firm, but unchanged. Discount on Black Butt-Welded Pipe, in carload lots and upward, 45 %; less than a carload, 42½ %; Galvanized do. in carlots and upward, 35 %; less than a carlot, 2½ %; Black Lap-Welded Pipe, in carlots and upward, 62½ %; less, 60 %; Galvanized do., 45 %; less than a carload, 42½ %. Discount on Boiler Tubes, 55 % off. Two-inch Oil Well Tubing, 13¢ ℔ foot, net; 5⅝-inch Casing, 40¢; 8-inch Drive Pipe, $1.30.

Old Rails.—We can report sales of Old Iron Rails at $23, and it is said that they are now hard to obtain at that figure. Old Steel Rails are still quoted at $19 @ $20.

Steel.—Notwithstanding the enhanced price of the raw article, prices for products remain unchanged, although they are firmer, and some of our manufacturers are refusing to contract for future delivery at present prices. Best brands Refined Cast Steel, 8½¢; do. Crucible Machinery, 4½¢ @ 4¾¢; do. Open Hearth and Bessemer, 2½¢ @ 3¢; Bessemer Blooms and Billets, $33 @ $34; do. Nail Slabs, $31.50 @ $32.

Steel Rails.—There is possibly not so much inquiry, but prices are firm at $35 @ $35.50, cash, at mill, for Heavy Sections. Mills are all well sold ahead, and this important interest is in a much more satisfactory condition than at this time last year.

Railway Track Supplies.—Demand only fair; prices unchanged. Spikes, 2.25¢, 30 days, delivered; Splice Bars, 1.65¢ @ 1.75¢; Track Bolts, 2.75¢ @ 2.85¢.

Crop Ends.—New Crop Ends are scarce in this market, and in the absence of sales may be quoted at $21 @ $21.50 ℔ ton, and Steel Bloom Ends at $20 @ $20.50. These have been very scarce in this market for some time past.

Old Material—Of all kinds continues scarce and in demand, and prices are firm. No. 1 Wrought Scrap may be quoted at $17.50 @ $18.50 ℔ net ton—latter figure for Selected Shop Scrap; Wrought Turnings, $13 @ $14; Car Axles, $22 @ $23; Cast Borings, $12 @ $12.50, gross. Old Car Wheels scarce and higher; we hear of an offer to buy at $16.50, gross, having been declined. They are quoted at $17 @ $18 at Chicago.

Coke.—Blast-Furnace Coke is still quoted at $1.20 ℔ ton on cars at ovens, with an increasing demand. About 90 % of the syndicate ovens are in operation.

Window Glass.—No change in prices; trade light. Manufacturers' discounts on Single Strength, 75 %; on Double Strength, 75 and 10 %. There will not be much improvement in the demand until the spring trade opens up.

Chattanooga.

Office of *The Iron Age*, Carter and Ninth Sts.,
CHATTANOOGA, December 21, 1885.

Nothing of particular interest in general business has transpired during the past week to call forth special mention. Freights on all the railroads are still very heavy, and they are having all they can do.

Pig Iron.—The commencement of the past week signaled another advance of 50¢ @ 75¢ ℔ ton on all standard and desirable grades, although we must note a falling off to some extent in total amount of sales. This may be in some measure accounted for by the fact that many of the furnaces have sold considerably ahead, and do not care to make further contracts at present prices on what is apparently an advancing market, although there is quite a diversity of opinion as to what the future will bring forth, the general opinion being that the present prices will not only be maintained, but that the coming year will see another slight advance. One of the Dayton furnaces, which has been about ready to go in blast for several weeks, will probably blow in within the next few days, and the other will soon follow. So much has been said of this plant, and so much money has been expended in putting it in first-class order, that the results will be looked for with much interest among the Iron fraternity. Certain it is that if the command of a variety of Ores is an advantage they ought to turn out a first-rate quality of Pig Iron. There has been a disposition among the Southern foundries to contract for round lots more than ever, and a number of them have closed contracts for amounts ranging from 100 to 500 tons for the coming six months of the ensuing year. The business outlook for our Southern furnaces is good, and they report prospects good and some of them are enlarging their facilities. The prices of Pig are firm at the following quotations: In carload lots for No. 1, $15.75 @ $16; for Nos. 2 and 3, $1 less for the respective grades. Sale of a round lot of 1000 tons of No. 2 at $14.50 at the furnace, and offers of much more, are quite indicative of what our wholesale market is.

Bar Iron.—The mills report an advance to 1.70¢ for Common Bar for carload lots, and state that they are booked ahead for the next three months. There appears to be little disposition on the part of our Hardware merchants to contract far ahead at these rates, but they are satisfied to buy as they need the stock.

Railroad Fastenings—Are in good demand and the mills are running full turn.

Birmingham.

BIRMINGHAM, Ala., December, 21, 1885.

They say the farmers of Alabama have less money now than they ever had, if that is possible. What with the falling off of the crops and the small prices they have got for them, they lack a good deal of being in as good condition to begin the new year as they were 12 months ago. However all this may be, there is a good business now doing in this part of the State in almost every line, in some even for which the holidays could hardly have been expected to do much. Within the last two

weeks the railroads have begun to have considerable difficulty in moving their freight expeditiously.

Pig Iron.—The Pig-Iron market is higher than it was a week ago; some of the furnaces report even 50¢ advance. Gray Forge Irons have certainly sold here in the last few days as high as $13.50, though this is little above the average for the week. There are not many sales yet, for nearly all the furnace companies about here—all but one, indeed, so far as can be ascertained—still owe considerable quantities of Iron on contracts. The exceptional company are selling their Iron every day and shipping it as fast as the railroads can furnish cars. On Saturday 16 cars loaded with their product left their yard. It appears that the advance in prices is almost so much clear profit for the furnaces. A somewhat remarkable proportion of high-grade Irons is still reported in some quarters.

Finished Iron—There is not yet sufficient improvement in the prices of rolling-mill products to justify a change of quotations here. Altogether, though, a more satisfactory business seems to be doing now than there has been any time this year, except, of course, for the increased cost of materials.

Nails—Are still selling at $2.75 at the Alabama mills, with a downward tendency, if any. More explicitly, the cheapest Nails that come here are from Eastern mills again.

Miscellaneous.—There is nothing especial to be said for the business of the foundries and machine shops, unless it is that the demand for Structural Castings holds up unusually for this time of the year. Some inquiries that promise big orders in this line have been received here in the last few days. Cheap Castings have been made here, however, ever since Pig Iron began to be plentiful. Some rough and heavy pieces have been turned out at 90¢ a hundred, and some machinery work of a high grade averaging considerably below $3.

Iron Ores.—The furnaces that do not dig their own Ore are having to pay a little more for it now, according to a sliding scale of comparatively recent date, but the difference is not enough to offset advantages. Pig Iron has gained in other particulars.

Coal and Coke—Are in every respect about where they have been since summer, except that some of the Grate Coal operators have fallen behind their orders, and this latter fact is chargeable mainly to the railroads' embarrasing demand for cars. The advance in Iron has not raised Coke yet. This is supplied to the furnaces on a sliding scale, it is true, but the latter was made several years ago, and stipulated as a minimum price of Iron a figure that the market has not yet passed. So the unexpectedly heavy decline since this scale was made has all along borne on the Pig-Iron men almost entirely, and the advance now bears the same way mainly.

Cincinnati.

DECEMBER 21, 1885.

Pig Iron.—The market in the past week has shown no new features. No large sales reported, the market being confined to supplying the immediate wants of consumers, and at prices varying from 50¢ to $2 ℔ ton advance on quotations in August and September. Prices firm, with depleted stocks of No. 1 Coke Foundry and some of the Forge grades. Quotations for the past week:

CHARCOAL FOUNDRY.	
Hanging Rock, Best, No. 1, 4 mos.	$20.50 @ $21.00
Hanging Rock, Good, No. 1, 4 mos.	19.50 @ 20.00
Hanging Rock, Good, No. 2, 4 mos.	19.00 @ 20.00
Southern, Good, No. 1, 4 mos.	18.50 @ .. ..
Southern, Good, No. 2, 4 mos.	17.50 @ .....
COKE FOUNDRY.	
Ohio and West Pennsylvania, No. 1, 4 mos.	17.50 @ 19.00
Southern No. 1, 4 mos.	17.50 @ 18.50
Southern No. 2, 4 mos.	17.00 @ 18.00
SILVER-GRAY SOFTENERS.	
Hanging Rock (Jackson County), No. 1, 4 mos.	18.00 @ .....
Hanging Rock (Jackson County), No. 2, 4 mos.	17.00 @ .....
Hanging Rock (Jackson County), No. 3, 4 mos.	15.00 @ 15.50
Other makes and grades	14.50 @ 17.00
CAR WHEEL.	
Hanging Rock Cold-Blast Charcoal, 4 mos.	25.00 @ 26.00
Hanging Rock Warm-Blast Charcoal, 4 mos.	19.00 @ 21.00
Southern Warm-Blast Charcoal, 4 mos	17.50 @ 19.00
Southern Standard Warm-Blast Charcoal, 4 mos.	23.00 @ 25.00
Georgia Cold-Blast Charcoal, 4 mos	25.00 @ .....
FORGE.	
Various makes and grades	14.50 @ 17.00
SCRAP.	
Rails	18.50 @ 19.00
Wheels	15.50 @ .....
Wrought, ℔ 100 ℔	.60 @ .75
Cast, ℔ 100 ℔	.35 @ .55

Quotations on Pig Iron as above are f.o.b. here, or less freight to Cincinnati when orders are filled at furnaces; 50¢ ℔ ton discount for cash from time prices.

Louisville.

W. B. BELKNAP & Co., Louisville, under date of December 21, report as follows: The marked improvement indicated in our last report still continues. There is no boom, nor do we see how there can be one in the absence of large railroad construction. It is doubtful whether any other form of industry can be on a large enough scale to create a demand that will affect values over the whole Iron-producing world, as was done in 1879 and 1880. But after the extreme depression we have endured for several years it is only fair to expect a steady recovery. This country has certainly been adding to its wealth of purchasing power by persistent economy, and this bears its legitimate fruit now in improved business. It is hard, however, to make anything in the Iron line move up grade during the months of November and December. The latter is apt to be the dullest of the year, as merchants generally curtail their stocks with a view to the annual inventory. Spring operations have not yet assumed any definite shape, and people's minds are taken up with the avocations of the holiday season rather than with active business. Buying has from many sections been free, and all promise still better things after the 1st of January. No one seems to feel discouraged, and if such occurrences as the death of Mr. Vanderbilt do not shock the financial world it should give additional strength to the commercial movement.

Bar Iron—Prices are very firm. No contracts are being taken for more than 30 days ahead. Some of the mills have made an advance of fully $2 ℔ ton from their lowest figures, and seem determined to adhere to the same. Still the improvement in this line has not been so marked as that in raw material.

Sheet Iron.—The course of this has been somewhat peculiar. Since the manufacturers yielded last fall to the demands of the men there has been an immense output of the lighter gauges, and the market has steadily weakened until within the past few days. Some of the mills which were most anxious to sell have withdrawn figures and made an effort to advance the whole list. Others have retired from the market, and decline to make at the present prices.

Nails.—The card recently adopted at Wheeling has been firmly adhered to, so far as we can learn, by the makers of Steel Nails. This can be the more readily done as Pittsburgh is making no Nails and the production at Wheeling is still limited, but if the mills were running full we imagine the price, owing to the great capacity, would be almost, if not quite, as low as any time last spring. Another advance in Boat and Railroad Spikes may be noted. The total advance in 5½ x ⅛ Railroads is thus made 40¢ ℔ 100; on the other sizes, from 20¢ to 30¢.

Wire.—The manufacturers seem bound to uphold the recent advance, and we learn of no pressure to sell at anything else. The surrender of some of the largest moonshine Barbed-Wire factories at St. Lous has had a decidedly good effect upon the market here, and the new year will start in with better prospects for good prices. Buying of Barb Wire has been active, based on the conviction that the advance had come to stay. Still there had been considerable contracts made for both Plain and Barbed Wire, we take it, which will prevent the market from being too suddenly affected.

The beautiful weather we have had all this month has permitted the prosecution of building and outdoor work to go on without interruption. The effect on local trade has been beneficial, as there are few persons not employed as usual, and consequently earning wages. There is no destitution or distress, as is sure to accompany severe temperatures.

GEORGE H. HULL & Co., of Louisville, report to us as follows, under date of December 22: The market for Pig Iron, although not so active during the last week, is very firm and remains in about the same condition. Probably two-thirds of all the Coke furnaces South are holding out of the market and will not quote at all, while the other one-third will only book small orders, and these only at full prices. The furnacemen seem disposed to do what they can to discourage further advance and anything that will tend to exciting the market at present. We look for no further advance immediately, and think it will not occur during the next two or three weeks unless buyers urge the booking of orders to a larger extent than furnaces are able or willing to accept. Many buyers have already provided for their wants, but, of course, others have not. The furnaces are sold ahead much more than buyers are bought ahead, so that the current demand must be considerable, even though there is no future delivery demand. We look for a strong market and no weakening in prices. We quote for cash in round lots as below:

PIG IRON.	
Southern Coke, No. 1 Foundry	$18.00 @ $18.50
" No. 2 "	17.00 @ 17.50
" No. 2½ "	16.50 @ 17.00
Hanging Rock Coke, No. 1 Foundry	18.00 @ 18.50
Hanging Rock Charcoal, No. 1 Foundry	19.00 @ 20.00
Southern Charcoal, No. 1 Foundry	18.00 @ 20.00
Silver Gray, different grades	16.50 @ 17.00
Southern Coke, No. 1 Mill, Neutral	16.00 @ 16.50
" " No. 2 " "	15.00 @ 15.50
" " No. 1 " Cold Short	15.50 @ 16.00
Southern Charcoal, No. 1 Mill	16.50 @ 17.00
White and Mottled, different grades	13.00 @ 13.50
Southern Car-Wheel, standard brands	22.00 @ 24.00
Southern Car-Wheel, other brands	17.00 @ 21.00
Hanging Rock, Cold-blast	22.00 @ 25.00
" Warm-blast	18.00 @ 20.00

Old Material.—The principle articles of Old Material, such as Old Rails, Wheels, Car Axles, &c., are very firm at full quotations. Other classes of Scrap sympathize, but we hear of no sales that will justify a change in price. We quote for cash as below:

Rails, ℔ ton	$20.50 @ $21.50
Wheels, ℔ ton	14.50 @ 15.00
No. 1 Wrought, ℔ 100	.70 @ .75
Country Wrought, ℔ 100	.60 @ .65
No. 1 Cast, ℔ 100	.45 @ .50
Boilers, cut, ℔ 100	.60 @ .65
Boilers, uncut, ℔ 100	.40 @ .45
Axles	.90 @ .95
Flues, Tanks and Sheets, ℔ 100	.25 @ .30
Burned Scrap, ℔ 100	.20 @ .30

Imports.

The following were the Imports of Hardware, Iron, Steel and Metals into the Port of New York for the week ending Dec. 23, 1885:

Hardware.

Boker Hermann & Co.
Hardware, cutlery and guns, pkgs., 60
Cortis R. J.
Cases, 2
Slop pails, bdls, 8
Coppel Alex. & Co.
Arms, case, 1
Curley J. & Bro.
Case, 1
Downing R. F. & Co.
Ironware, cs., 50
Davis, Turner & Co.
Cases, 4
Pkgs, 3
Dreyfus, Weiller & Co.
Cases, 4
Field Alfred & Co.
Casks, 3
Case, 1
Anvils, 55
Pkgs., 6
Gurney Fred. B.
Pkgs., 7
Hammel L. & Co.
Case, 1
Jackson W. H.
Case, 1
Johnson John & Co.
Machinery, pkgs., 48
Loyd & Magnus
Cases, 2
Mallison F.
Cases, 2
Marquart H. & Co.
Cylinder, 1
Mer. Dis. Co.
Weapons, case, 1
Moore's Sons J. P.
Arms, case, 1
Pim, Forwood & Co.
Nails, kegs, 30
Schloss & Sons.
Mach. parts, case, 1
Schoverling, Daly & Gales,
Arms, cs., 28
Sussfeld, Lorsch & Co.
Tools, case, 1
Vom Cleff & Co.
Ironware, cs., 9
Ward J. E.
Machinery, case, 1
Wiebusch & Hilger,
Hdw. and cutlery, pkgs., 279
Anvils, 100
Witte John G. & Bro.
Cutlery cs., 4
Order,
Cases, 5
Machinery pcs., 3
Machinery, pkgs., 50
Casks, 5
Pkgs., 8

Iron.

Abbott Jere & Co.
Bars, 1901
Baring Bros. & Co.
Bars, 871
Wire rods, coils, 5066
Wire rods, case, 1
Rods, coils, 3894
Codlington, T. B. & Co.
Sheets, bdls., 514
Crocker Bros.
Ferro iron, tons, 577
Ferro iron, casks, 106
Downing R. F. & Co.
Girders, 130
Henry, A. T
Pig, tons, 25
Lillienberg N.
Bars, 120
Lundberg Gust.
Bars, 1200
Lazard Freres,
Rods, coils, 3580
Rods, bdls., 975
Rods, pkgs., 2549
Mason John W. & Co.
Wire rope, coil, 1
Mer. Dis. Co.
Wire, bdls., 130
Mickerts Oscar,
Wire cks., 2
Perkins C. L.
Spiegel, tons, 1200
Plock & Co.
Rivet wire rods, 268
Rods, pkgs., 644
Stetson Geo. W. & Co.
Pig, tons, 100
Order,
Girders, 40
Bars for Canada, 1028
Bdls. for Canada, 928
Cables for Canada 185
Chains, kegs, for Canada, 113
Bdls. for Canada, 100
Pig, tons, 390
Rail crops, tons, 220
Bars, bdls., 400
Rods, pkgs., 654
Rods, coils, 6660
Coiled rods, cks., 38
Ferromanganese, cks., 84

Steel.

Abbott Jere & Co.
Cases, 31
Baring Bros. & Co.
Rods, bdls., 18,603
Cary & Moen,
Casks, 6
Crabb Wm. & Co.
Bundles, 78
Downing R. F. & Co.
Cases, 72
Frasse & Co.
Wire, case, 1
Naylor & Co.
Rails, kg., 300,140
Rods, bdls., 6289
Crop ends, tons, 300
The Lalance & Grosjean Co.
Plates, bdls., 25
Wagner, W. F.
Bdls., 194
Bars, 22
Cases, 51
Order,
Rods, bdls., 15,443
Bars, 25
Axle, 1
Casks, 11
Bdls., 6
Cases, 15

Metals.

Beck F. & Co.
Plated sheets, cs., 2
Bache Semon & Co.
Tin, cs., 13
Baring Bros. & Co.
Tin plts., bxs., 1474
Bruce & Cook.
Tin plts., bxs., 186
Blake Bros. & Co.
Plumbago, bbls., 81
Dickerson, Van Dusen & Co.
Tin plts., bxs., 6967
Downing R. F. & Co.
Nickel, cks., 3
Funk & Wagnalls,
Stereo. plates, cs., 8
Lamarche H. & Son,
Rolled zinc, cks., 25
Marvel W. D.
Aluminium bronze, cks., 2
Naylor & Co.
Tin plts., bxs., 550
Tin slabs, 2554
Lead, pigs, 2501
Pfizer Chas. & Co
Metal, case, 1
Phelps, Dodge & Co.
Tin plts., bxs., 7605
Richardson W. S.
Old metal, bbl., 1
Wheeler, Fellows & Sparks,
Tin plates, bxs., 500
Winter & Smillie,
Plumbago, bbls., 167
Order,
Tin plts., bxs., 11,184
Tin slabs, 7773
Tin leaves, cs., 3
Antimony, cks., 270
Plumbago, bbls., 531
Lead, pigs, 1600
Spelter, ingots, 2461
Black taggers, bxs., 100
Black plts., bxs., 300

The imports at this port of Cutlery, Hardware and Metals for the week ended December 18 were as follows:

	Quantity.	Value.
Brass goods	44	$8,113
Bronzes	34	4,910
Chain and anchors	26	991
Clocks	40	3,570
Copper	...	156
Cutlery	126	21,165
Gas fixtures	1	246
Guns	42	5,835
Hardware	3	356
Iron, pig, tons	1,181	22,186
Iron, sheet, tons	20	1,567
Iron, other, tons	916	43,426
Machinery	136	16,883
Metal goods	261	23,379
Needles	16	5,165
Nickel	1	3
Platina	1	706
Percussion caps	7	2,080
Pins	16	1,961
Saddlery	7	1,100
Steel	46,564	45,008
Tin, bxs	26,698	94,331
Tin, 1006 slabs; ℔	74,852	15,932
Wire	154	1,620
Zinc oxide	150	1,226

The comparison for two years since January 1 is as follows:

	51 weeks of 1885.	Same time 1884.
Cutlery, pkgs	4,702	5,055
Hardware, pkgs	809	722
Iron, R. R., bars	7,560	9,422
Lead, pigs	38,766	42,194
Steel, pkgs	2,219,373	1,828,410
Tin, bxs	1,841,026	1,939,609
Tin slabs, ℔	19,444,729	24,570,406

Exports.

The following list embraces the Exports of Hardware, Machinery, Iron, Metals, &c., from the Port of New York, for the week ending December 22, 1885:

	Quan.	Val.
Dutch West Indies.		
Mf. iron, pkgs	2	$130
Cutlery, case	1	24
Yellow metal, case	1	50
Sheath. copper, case	1	78
Printing press	1	871
Nails, kegs	2	13
Windlass	1	50
Christiania.		
Nails, bxs	5	44
Printing press	1	350
Hamburg.		
Mf. iron, pkge	1	700
Steel, bdls	6	18
Pumps, pkgs	6	250
Knitting machines, cs	41	3,750
Sew. ma., cs	208	6,500
Hdw., cs	30	485
Prtg. presses, pkgs	4	500
Clocks, cs	9	199
Danish West Indies.		
Iron hoops, ℔ 1000		30
Mach'y, pkgs	30	1,300
Pump	1	105
Copenhagen.		
Mf. iron, pkgs	4	185
Hdw., case	1	42
Bremen.		
Mf. iron, pkgs	10	254
Ag. imp., pkge	1	125
Hdw., pkgs	13	578
Cutlery, cs	2	1,003
Mach'y, pkgs	8	729
Rotterdam.		
Ag. imp., pkge	1	90
Wringers, cs	45	1,200
Hdw., cs	16	280
London.		
Hdw., pkgs	170	4,334
Cartridges, cs.	2	66
Mach'y, pkgs.	88	3,016
Firearms, cs.	7	1,500
Clocks, bxs	118	1,910
Ag. imp., pkgs.	75	5,226
Scales, cs	20	212
Mf. iron, pkgs	12	197
Revolvers, case	1	30
Iron drums	35	525
Guns, cs	16	2,300
Rifles, cs	2	133
Bayonets, cs.	20	3,000
Scabbards, case	1	50
Pumps, pkgs.	10	761
Saws, case	1	40
Hull.		
Hdw., cs	47	154
Mf. iron, pkgs.	18	415
Clocks, cs	63	708
Glasgow.		
Ag. imp., pkgs	4	18
Sew. ma., cs.	9	761
Mf. iron, pkgs	19	365
Hdw., cs	25	1,078
Clocks, cs	34	436
Mach'y, pkge.	1	85
Liverpool.		
Saws, cs	30	194
Mach'y, pkgs.	72	4,762
Guns, cs	16	2,042
Tinware, cs	7	332
Plumb. mat'l, cs	4	197
Corset wire, bbl	1	120
Scales, cs	74	8,000
Old copper, pkgs	4	112
S. rollers, case	1	90
Copper ore, sacks	8988	47,800
Mf. iron, pkgs.	9	249
Ag imps., pgs.	47	1,519
Hdw., cs	59	4,029
Clocks, pkgs.	704	18,949
Sew. ma., cs.	412	3,234
Sew. ma., cs.	149	2,977
Cartridges, cs.	58	1,293
Revolvers, cs.	2	1,024
Primed shells, cs	3	602
W. closets, pgs	18	207
Nails, case	1	11
Scales, cs	13	174
Cutlery, cs	5	281
Shot, kegs	17	110
Mach'y, pkgs.	17	1,414
Firearms, case	1	196
Sugar mill	1	79
Palermo.		
Clocks, cs	8	430
Venezuela.		
Fishhooks, case	1	21
Mf. iron, pkgs	71	202
Hdw. cs	76	926
Mach'y, pkgs.	20	180
Cutlery, cs	2	116
Sheet lead, rolls	2	53
Scales, cs	6	141
Steel rails	225	722
Clocks, cs	5	89
Sew. ma., cs.	8	252
Boiler	1	180
Iron, pkgs	20	38
Central America.		
Mach'y, pkgs.	2	66
Hdw., pkgs.	20	345
Saws, case	1	15
Tacks, cs	3	19
Nails, kegs	3	26
Mf. iron, pkgs	31	134
Tinware, cs	2	87
Porto Rico.		
Nails, kegs	20	50
Mf. iron, pkgs	12	54
Hdw., pkgs.	38	274
Tinware, case	1	5
Cutlery, case	1	17
Clocks, pkgs.	2	65
Spikes, kegs	10	48
United States of Colombia.		
Hdw., pkgs.	93	1,628
Sew. ma., cs.	30	793
Cutlery, cs	17	158
Iron, pkgs	636	11,098
Nails, kegs	30	88
Cartridges, cs	27	605
Tinware, cs.	19	430
Plimbers' mat'l cs	6	149
Scales, cs	29	243
Clocks, pkgs.	15	318
Rifles, case	1	72
S. metal, bxs.	2	130
Br. goods, case	1	81
Mach'y, pkgs.	188	7,154
Mf. iron, pkgs	154	1,166
Saws, cs	3	13
Tacks, cs	3	50
Revolvers, cs.	4	998
Chain, lengths	3	227
Sandwich Islands.		
Hdw., pkgs.	180	3,991
Ag. imp., pkgs	64	1,873
Car wheels	240	1,004
Pumps, pkgs.	3	181
Guns, cs	2	55
H. shoes, kgs.	80	322
Iron, pkgs	188	177
Kettle	1	73
Mf. iron, pkgs	424	5,219
Cutlery, cs	7	455
Tacks, pkgs.	2	26
Nails, kegs	1,294	3,929
Wire cloth, cs.	10	446
Solder, case	1	40
Nails, cs	14	170
Buckles, cs	2	37
Steel, pkgs	7	78
Hayti.		
Clocks, case	1	31
Hdw., cs	2	17
Nails, kegs	4	13
Mf. iron, pkge	1	25
Anchors, case	1	27
Brazil.		
Hdw., pkgs.	385	3,678
Firearms, case	1	135
Revolvers, case	1	105
Irons, cs	50	245
Mf. iron, pkgs	473	1,992
Water wheel	1	190
Ag. imp., pkgs	60	477
Cartridges, cs	2	50
Clocks, bxs	117	550
Argentine Republic.		
Carbines, box	1	114
Hdw., cs	111	1,500
Mach'y, pkgs.	9	950
Pumps, pkgs.	4	130
Cartridges, cs	28	452
Ag. imp., pkgs	108	1,759
Rifles, cs	5	722
Car wheels, pairs	20	925
Peru.		
Hdw., pkgs.	19	564
Tacks, cs	5	45
Pistols, case	1	29
Mf. iron, pkge	1	14
Locomotive	1	3,187
Nails, cs	19	40
Pumps, pkge.	1	20
Nails, kegs	30	144

Coal Market.

The Anthracite Coal trade is very quiet and unsatisfactory, with prices unsettled. Contradictory reports are circulated respecting the course of the market, some confidently predicting higher prices, but the concensus of opinion favors a lower range. This view receives support from the fact that the Pennsylvania Coal Co., in a circular announcing the usual winter change of base from Newburg to Weehawken, preserve the list of November 1, which is equivalent to a reduction, as follows:

Grate, ℔ ton	$3.25	Chestnut, ℔ ton	$3.50
Egg, "	3.35	Pea, "	2.30
Stove, "	3.90	Buckwheat, "	1.90

25¢ ℔ ton additional for delivery at New York, alongside.

The Lehigh Valley Railroad Co., the Lehigh Navigation Co. and the Pennsylvania Railroad Co. show no disposition to unite with the Reading and New Jersey Central companies in an attempt to advance. The latter are talking about 15¢ ℔ ton higher, but pending the Reading election for president, to take place three weeks hence, no definite agreement is probable. At the same time confidence is expressed on all sides that Coal must improve with Iron, that the blast furnaces are not likely to be influenced either to open or close on account of variations in the price of Coal, and that an advance along the whole line is only a question of time. No conclusion has yet been reached respecting the production for the coming year, nor is any permanent understanding possible so long as certain large corporations in the Coal trade hold aloof in an independent attitude. Most of the old managers still hope that harmony may be reached, so that production shall be restricted to the legitimate demand. The fact that some insist upon the "go-as-you-please" method naturally makes others vie in offering inducements to buy.

The total amount of Anthracite Coal sent to market for the week ending December 12, as reported by the several carrying companies, was 716,964 tons, compared with 737,200 tons in the corresponding week last year. The total amount of Anthracite mined thus far in the year 1885 is 29,977,163 tons, compared with 29,742,163 tons for the same period last year, an increase of 235,000 tons.

The following gentlemen have been chosen as directors of the New Central Coal Co. of Maryland: David G. Legget, O. D. Baldwin, Harry Conrad, Dexter A. Hawlins, George H. Hoyt, William S. Jacques, John J. Van Nostrand, E. R. Livermore, Jose A. del Valle, J. L. Hathaway, Rufus Blodgett. The Bituminous trade has no new features.

Advantages of Iron-Making in the South.

The series of articles which have appeared in *The Iron Age* on Southern coke, and its bearing upon the manufacture of iron in that section, have brought out a number of critics. One prominent iron manufacturer has said "that it is not best thus to advertise our poverty; that with such an array of our disadvantages capital will not invest among us." The truth at its worst is always the best in the end. No misrepresentation can ever result in anything but dissatisfaction ultimately, and when money is lost causes a feeling against the section where the disaster has occurred, and is certain to work to its injury. Is it not better that the Northern investor should come to the South feeling that while he can have low-priced ores he also has to contend with inferior cokes, and to have him by skill and industry overcome or mitigate the disadvantages, than to have him base his plans and expectations on false grounds and be disappointed? It has been and is the intent of the writer of these articles to state the facts as they relate to the resources of the South, and to bring out the advantages and disadvantages of making iron in the South as they are. The great drawbacks of the South are the lack of large bodies of rich ores free from phosphorus, and of a first-class coke; its one great advantage is its labor.

In times of high-priced pig iron, iron ore is high at the North; when iron is low, ore falls with it. So also with the Northern labor. As a general rule it is intelligent and appreciates the situation. As iron falls, its demands are more moderate. Hence, with the iron-maker of the North there is an advantage when iron is low; the cost of his articles of consumption go down with the price of his product. On the other hand, the Southern manufacturer pays nearly or quite as much for his iron ore and his labor in times of low-priced iron as when the product of his furnace brings a high price. His labor is generally not intelligent and does not appreciate his situation when pig iron is low in price, and also does not see its own possibility for an advantage when the product rises in value. Hence, however it may have been urged to the contrary, the time when the Southern manufacturer of pig iron has his greatest advantage over his Northern competitor is when pig iron brings a high price. Assuming that pig iron goes up $2 per ton, and the rise is maintained for some time, the Southern manufacturer gets his ore and his labor at the same price as before, while the laborer of the North calls upon his employer for a corresponding increase of wages, and the Lake Superior miners advance the price on their ore. To the Southern manufacturer of pig iron a rise of $1 or $2 per ton in times of stringency represents that much profit. To the Northern manufacturer it represents an advantage only for the short time it takes his ore supplier and his intelligent laborer to learn that pig iron has risen that amount. The advantage of the Southern manufacturer continues for months, perhaps throughout the era of high prices. In this point lies the great advantage of the Southern manufacturer. It gives him ore and labor at low cost when iron is high. It may be claimed that his labor is not as valuable, does not do the same amount of work per man, as that of the North. The practical facts are that as few laborers are employed around well-managed Southern furnaces per ton of iron made as at those of the North. In fact, if in any one thing the South excels it is in the amount of labor performed by and the cost with which her unskilled labor is handled. It cannot be denied that the South needs intelligent labor for machine shops and foundries, but no one can look into the workings of iron mines and iron furnaces in the two sections without admitting that the amount of ore produced per hand and the amount of pig iron made are as great in the South as in the North.

In times of low-priced iron the South has no advantage in its ores for the reason stated. Brown hematites now cost the Lehigh furnaces $2 per ton in the stockhouse. They cost the Southern furnaces $1.75 to $2, but, should pig iron go up to $20 per ton, the Lehigh ore would cost $3 to $4, while the Southern ore would not materially advance. The South will derive prosperity from its iron interests and have an advantage from a moderate rise in the price of iron, which shall be maintained over a great length of time. It will not derive as much advantage from a sudden and large rise lasting only for a short period as the Northern furnaces will. Another present advantage the South has is the low rate of freights given on all raw material by the railroads. That this is given to encourage in part industry, and may not have in it the elements of permanence, is possible, but it is likely to be many years before Southern roads are likely to be so crowded with freights that they will advance upon the liberal rates now given on ores, limestones and cokes. The usual rate on these articles to furnaces is ¼ cent per ton per mile, and there are instances where even a much more liberal rate is given and guaranteed for a period of years. H. E. C.

The Secretary of the Treasury has appointed Edward Marsland to be inspector of boilers of steam vessels at the port of New York, vice J. K. Matthews removed.

Trade Report.

General Hardware.

With the close of the year business naturally shows a materially diminished volume, but there are increasing indications of an improved tone and more hopeful feeling. Many lines of Hardware give no indication of any change in quotation, but other lines, some of which are alluded to below, show a decided tendency toward better prices. The impression also prevails that the summing up of the season's business will make generally a better exhibit than was anticipated. Altogether the year is going out with what is regarded as a much better condition of things than existed a year ago.

LOCKS.

Our readers will be interested in the revised Lock list which we present herewith in advance of its publication by any of the manufacturers. It will be observed that the Lock Association, in adopting this new list, have made a radical change in their prices, a reduction being made, as we intimated in our last issue would be made, in the entire line. It will be perceived that the common goods on which there has been the most vigorous outside competition are materially lowered in price, but at the same time that in many of the better grades of Locks a substantial reduction is made. It is evident that a complete revision has been made, making substantially a new list, the manufacturers having decided that this was advisable, as the former lists, though frequently changed, were made upon the old basis, and retained with each change many inequalities which were found also in the last. This unevenness, as many goods were altogether too high and out of proportion to others, besides preventing the sale of these goods, is referred to as contributing not a little to the late inequalities in price, in many cases leading to the making of net figures materially lower than if the goods were sold at the regular discounts. These inequalities have been becoming increasingly troublesome, as certain styles of goods, at one time but little sold, have been coming into greater demand. The new list, thus regarded as brought up to the present time and suited to existing conditions, will be welcomed by the trade as a marked improvement and a step toward greater regularity in prices. Its result will be, without doubt, to make the real price nearer to the nominal price than it has been for some time, and this in the present condition of the market is exceedingly desirable, while at the same time it will put many good Locks at more reasonable figures than they have heretofore been held. This action is presumed to have been taken with reference also to the outside manufacturers, who have been constantly enlarging their line, as well as with a view to discouraging the establishment of new competing enterprises. But that our readers may be aided in apprehending the scope and effect of the changes made, and at the same time have definite information as to the prices of Locks under the present arrangement, we lay before them the following tabulated statement, which gives a description of some leading and representative Locks, with the net prices under the former list at discount 66⅔ per cent., and as compared with the prices under the present list at discount 50 per cent. The latter prices are calculated from the Mallory-Wheeler Co.'s list, printed below, whose numbers are given in one column, together with the Russell & Erwin Mfg. Co.'s corresponding numbers in another column:

In connection with the new list the Lock manufacturers adopted a discount of 50 per cent., and 2 per cent. additional discount for cash, with an extra 5 per cent. discount on purchases of $500 worth in six months. The first printed announcement of the discount which has come to us was from the Nimick & Brittan Mfg. Co., Pittsburgh, who inform the trade of a change in their entire list on Door Locks, which will be issued in full and complete form by the 30th inst. In mentioning the discount named above they also send out the following list on Common Locks, which is, of course, subject to the discount named:

Rim Locks.

Nos....	0221	0222	0226	0401	0402	0406
List	$2.20	3.10	3.10	2.45	3.35	3.35

Mortise Locks.

Nos....	01001	01051	C1052	01056	1053	1057	01063	01072
List...	$0.98	2.20	3.10	3.10	6.75	6.75	5.50	6.15

We have not as yet received definite advices from any of the outside manufacturers of Locks, announcing the action that they will take in consequence of this movement by the association, but it is intimated that they will meet the association prices, and probably, as heretofore, undersell them.

The trade will receive with gratification the announcement of this change in prices, which, it is hoped, may result in giving some regularity to the prices of Locks, and avert a good part of the demoralization in this line which has of late prevailed. They will also recognize the desirability of having the better grade of goods sold at as low prices as the cost of manufacture will allow, and the expectation is expressed that the action taken will result in an increased sale of the better grades.

We give on the opposite page the greater part of the Mallory-Wheeler Co.'s list, the prices of certain numbers being omitted, as undetermined at the time it was received from them. It gives, however, most of the leading goods, and will be of interest to the trade. It is subject, as announced above, to a discount of 50 per cent., and an additional 2 per cent. for cash within 30 days.

NAILS.

The market has been quiet and without strength. The demand is light and buyers are holding off, being confident of securing better figures in the future. During the current and the coming week the majority of the Nail mills will be closed down. They have been driven so hard to full capacity during the past months that the usual holiday repairs will probably turn out considerably more extensive than usual. This will, of course, tend to keep unmanageable supplies from the market for the present. It is likely that a general reduction of wages will take place during the early future at the Eastern mills. In fact, in one or two instances a reduction has already taken place. It is likely that the men will accept the situation, since the higher prices during the past few months were simply due to exceptional circumstances. The drop in the market has been sudden and considerable, but thus far is confined particularly to carload lots, for which there are very few purchasers, and which are offered at low figures. We quote Nails from store, $2.50 @ $2.60.

BARB WIRE.

During the week the Western manufacturers have advanced the price of Barb Wire to 4 cents for Painted and 5 cents for Galvanized, and orders transmitted at old figures has been summarily rejected. As we go to press the leading Eastern manufacturers are holding a conference at which a revision of the prices is to be made. It is believed that an advance to figures corresponding to those of the West will be decided upon.

AMMUNITION.

We have recently addressed letters to some of the leading houses dealing in Ammunition, requesting an expression of their views as to the probability of the successful carrying out of the plan adopted by the manufacturers. From the letters received in reply we make the extracts which are given below, which indicate, it will be seen, the expectation on the part of these dealers that the plan will result successfully and be accepted generally by the trade. A prominent house, alluding to the position occupied by the special dealers appointed by the association, refers to the situation and outlook as follows:

There has scarcely been sufficient time to gather the general opinion of dealers as to its merits. After this matter gets into perfect working order, then would be the time to criticise. On general principles we would say that any arrangement by which a few dealers obtained a known advantage over the many would be apt to create jealousy and feelings of dissatisfaction more or less among the many, and if the matter ended there we might very well hazard the opinion that the present arrangement for the sale of Ammunition will have this objection; but the matter does not end there. The facts of the case are just these: There are certain houses who have developed a large trade in Ammunition, and who consequently will (we were going to say, under almost any circumstances) maintain their position toward the trade of the country, to which they had attained only after the efforts of years. The present arrangement, giving these houses a special position, is doing no more for them than they would do for themselves under an entirely open and free market, with the difference that many dealers can now make a profit, which with an open market they would not do; this experience has shown to be a fact, and we therefore believe that the arrangement consummated by the Ammunition Manufacturers' Association will give general satisfaction. We take it that business men are in business to make money, and that which will enable them to do this must render an arrangement like the present one generally satisfactory. Of course the workings of this plan must be tested by actual experience, and there may be certain things that will require corrections, but of this we feel certain that the Ammunition Manufacturers' Association, while certainly organized for the protection of the manufacturers, are earnest in their efforts to render the sale of Ammunition profitable to all classes of dealers, recognizing the fact that those plans which will accomplish this will be the most conducive to their own prosperity.

Another prominent concern, referring to the general position and especially the past demoralization which has existed in the market, after characterizing the new plan adopted by the association as the best one yet tried, and expressing their hope that it will work to the benefit of both manufacturers and dealers, says:

Undoubtedly there will be many complaints that it is unjust to a portion of the trade, but, on the other hand, it has been demonstrated and proved by the past year's experience that under the old system not only was there no money to any one handling the goods, but that all dealers who wished to handle them must do so at an actual loss—actually sell at from 2½ to 5 per cent. less than cost in order to compete with their neighbors. Consequently, every one was becoming disgusted and not trying to sell, thereby working certainly to the disadvantage of the manufacturers. Assuredly, under the present system such portion of the trade is not worse off than before, and we have faith to believe that when everything gets systematized and arranged all parties who make a regular business of handling the goods will make more money than they have heretofore been doing, and more goods will be sold. It is a little early yet to get at any opinion of the general trade, and we can only say that so far we have not heard many complaints.

The desirability of having special distributing dealers in the principal cities is alluded to in the following letter:

We believe the plan adopted by the manufacturers' association will prove successful and profitable to the entire trade, because in the plan is an element of fairness which did not appear in former contracts. Aside from personal interest we believe that the appointment of special distributing dealers in New York, Boston, Philadelphia, Chicago and St. Louis will work decidedly to the advantage of all contract houses, as they may buy of any of the special dealers at the same discount as of the manufacturers, and to meet their wants larger stocks will be carried in the several distributing points. Our faith in the practical working of the scheme is based on our belief that it is now in the interests of the entire trade to work in harmony with the association, the contracts not now being faulty in such features as resulted in the late unsettled prices.

The extract given below refers briefly to the impressions of our correspondents as to the way in which the scheme is regarded by the trade at large:

As far as we can judge from the comments of our correspondents upon the new Ammunition arrangement, the plan meets with almost unanimous approval. The objections that suggested themselves at first, upon being carefully considered, prove to be trivial when weighed against the substantial advantages assured under the new agreement.

The following less sanguine view of the outlook is from a house that is widely known and has been somewhat prominent in the recent competition:

There is a decided difference in the opinions of the various jobbing houses, and more or less dissatisfaction. As to the outcome of it, as the plan devised seems to be the only one that could be got at that would stop the slaughtering of the past season, we think as soon as it gets working thoroughly it will be received with as much satisfaction as any plan that could be devised.

In the letter given below our readers will note the expectation expressed that the association will be sufficiently strong to discard from their lists houses that do not live up to the spirit of their contracts, a measure which, our readers will observe, may be necessary in order to avert some of the irregularities to which we referred last week as apprehended by some in the trade:

We consider the present arrangement to be a good one, and of special interest to all those houses that have a contract with the association, and have good reason to believe that the present agreement will hold and benefit every one, and it is for this reason that we believe it will be a lasting affair, which is somewhat corroborated by the willingness of all the trade to sign the agreement. We only hope that the association will be strong enough to discard from its lists any individuals that will not live up to the spirit and word of their contract, thereby benefiting those who honestly adhere to what they promise and agree.

ARRANGEMENT OF HARDWARE STORES.

A New Hampshire Hardware house send us the following description of the Shovel Rack represented in the accompanying illustration, Fig. 1, remarking that after trying many methods and setting the goods up in every conceivable manner during the past 20 years they have found comfort and convenience in this device. Their description of it is as follows:

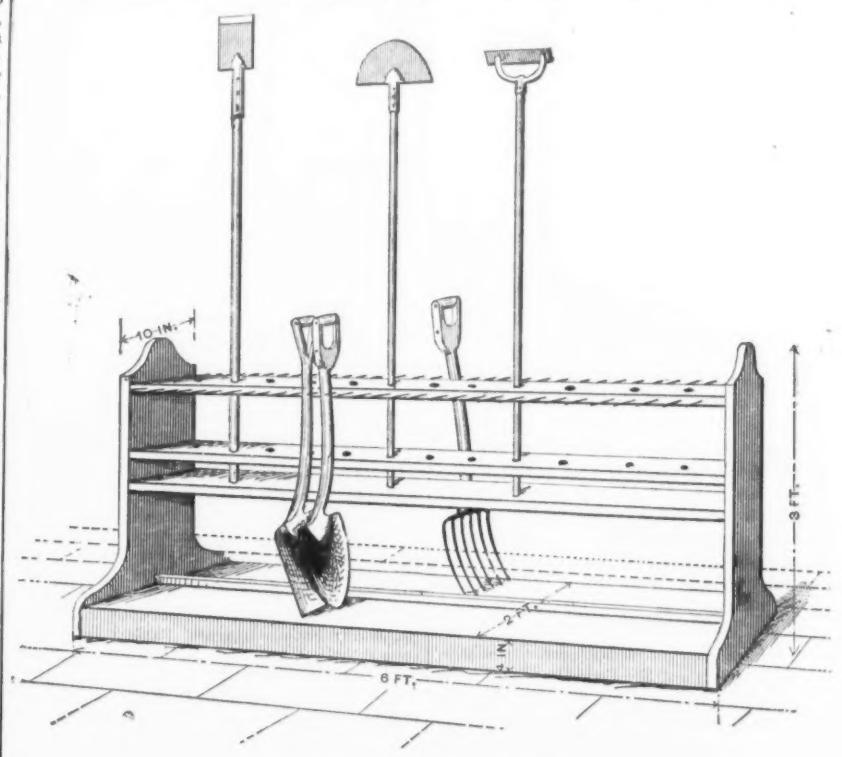


Fig. 1.—Shovel and Fork Rack.

The Shovel Rack shown in the diagram Fig. 1 will be found convenient either for retailing the goods or for holding jobbing samples. It is made as follows: The platform is 6 feet long, 2 feet wide, and 4 inches high, and placed upon strong casters. This is wide enough for two rows of Shovel blades or Forks. At the center of each end set standards 10 inches wide and 3 feet high. Between the standards place three horizontal shelves as wide as the standards, the lowest shelf 16 inches above the platform, the second 18 inches, and the top one 27 inches; put pins of No. 3 iron wire, slightly bent near the end, horizontally upon the edges of the shelf, 30 upon each side. This will hold five dozen Shovels or Forks. Put the blades at right angles with the side of the platform, as shown in the cut, and rest the handles against the pins, with the D above the top shelf. Holes may be bored perpendicularly through the two upper shelves, and through them handles of Hoes, Scuffles, Edging Knives, &c., can be thrust, their ends resting upon the lower shelf and their blades in the air. If one does not care to keep goods thus, the two lower shelves may be omitted, but while we do not altogether like the appearance of goods in that position it is economical of room. This Rack can be constructed two-storied, using the upper deck for long-handled goods, and the dimensions modified to suit circumstances. The width as given above is sufficient for two rows, and no gain will be made by changing it.

Reference having been made by some of our correspondent to the Railroad Step-Ladder, with inquiry as to its usefulness, Morley Brothers, East Saginaw, Mich., who manufacture it, have sent us the names of the following parties who are using the Ladder, and to whom they desire to refer any who desire information as to its utility:

CHAS. STRELINGER & Co., Detroit, Mich.
W. B. BELKNAP & Co., Louisville, Ky.
DUNHAM, CARRIGAN & Co., San Francisco, Cal.
GEO. TRITCH HARDWARE Co., Denver, Col.
BOETTCHER HARDWARE Co., Denver, Col.
G. C. GREENWOOD & Co., Duluth, Minn.
P. T. MOREY, Belton, Tex.
GEDNEY & Co., Bay City, Mich.
J. J. COSTILLO, Duluth, Minn.
MCINTOSH, GOOD & HUNTINGTON, Cleveland, Ohio.

A circular illustrating the construction of this Ladder and explaining its special features is issued by the manufacturers, and will doubtless be sent to any desiring it.

The following from a wholesale and retail Hardware house in the Southwest refers, it will be seen, to this Ladder, and also to details upon a number of other matters relating to the general subject under discussion. Our correspondent says:

I have been much interested in your articles on Hardware stores. In your issue of December 10 you ask for statements relative to Rolling Ladders made by Morley Bros., East Saginaw, Mich. I have had them in use for a year, having purchased, so far as I know, the first ones in this State. One of them is on a 70-foot line of shelving and the other on a 40-foot line. I like them very much, and do not see how I could dispense with them. My shelving goes to the ceiling, 13 feet 6 inches. My room is 25 x 135, too narrow to use a balcony, which if it were 40 or 50 feet wide I might have. The same end, however, is reached with the Ladders as with the balcony. But little retail stock and but few broken packages are placed over 7 feet high, thus requiring the Ladders only for full packages. Up to a hight of 7 feet my shelving is filled with Green's wooden Hardware boxes, with the green paper pasted over ends. All goods that will sample are sampled on these boxes, the samples being put on with screws, blind staples or copper wire. The boxes were made for the shelving, and fill up all the space where boxes are to be lettered or numbered. I use the black and gold gummed letters. Table Cutlery I put in showcase and also on shelves, sampling the outside box. Your Rack, Fig. 1, in the issue of December 10, for Shovels and Spades is good—the best I have seen. For Bolts and Screws I use Westphal's cases. For Bolts it is first class. For Screws I would like boxes better, as it takes too long to get the Screws out of the little bins in Westphal's case. I have counters on only one side of the store, in front of the 40 foot shelving. Would do away with all counters excepting Nail and case counters. In using shelf boxes it is best to have shelf openings of the same size. In deciding on the sizes of boxes adopt Green's interchangeable plan. It will require about 20 different sizes for an ordinary stock. On each box I use one or two (according to the size of the box) ¾-inch porcelain stove knobs for a pull. The effect is good.

The illustration, Fig. 2, which we give below represents a Horse Shoe Rack for which we are indebted to a Hardware house who speak highly of its convenience and utility. Its general arrangement will be understood from the diagram given, in which it will be observed the dimensions are

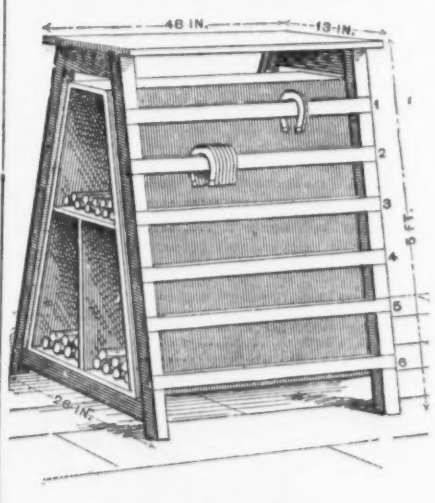


Fig. 2.—Horseshoe Rack.

indicated. One side of the Rack is used for Fore and the other for Hind Shoes. The bars are covered with ⅞-inch hoop iron for the purpose of protecting the wood, and each bar is described as holding a keg of Shoes. For the purpose of utilizing the space inside the Rack a box is made as represented, with three divisions for Pick, Stone, Axe and other Handles, but our readers will observe that the space can be used for many other kinds of goods if desired. Horse Nails are kept in boxes on top of the Rack.

Referring to the shelving arrangement of boxing and other matters a correspondent says:

Do not make shelving less than 14 inches deep. There are plenty of boxes 12 and 14 inches long containing Hardware, and when they project beyond the rest of the goods a good appearance is not presented. Deep shelves take up no real room, and they are a great benefit. A number of boxes containing the same goods as are shown in front can be tiered back and only the front box sampled, and thus all space is used. We are in favor of paper boxes, the original packages, preferring them to the wooden boxes. We use

Mallory-Wheeler Co.'s No.	Russell & Erwin Mfg. Co.'s No.	Description of Locks.	Net price at 66⅔ per cent. discount from list Dec. 10, 1884.	Net price at 50 per cent. discount from list Dec. 18, 1885.
0	2040	Mortise Knob Latch, 1¼ x 3⅛, Iron Front and Bolt	$0.58⅓	$0.49
103	60	Mortise Knob Latch, 1½ x 3¼, Iron Front and Bolt	1.63⅓	1.12½
105	61	Mortise Knob Latch, 1½ x 3¼, Iron Front and Brass Bolt	2.10	1.50
109	42½	Mortise Knob Latch, 1½ x 3¼, Brass Front and Brass Bolt	3.50	2.00
0379		Mortise Knob Lock, 3½ x 3¼, Iron Front, Iron Bolts, Tinned Key	2.25	1.87½
0581	2002	Mortise Knob Lock, 3⅛ x 3¼, Iron Front, Brass Bolts, Brass Key	3.25	2.75
0584	2003	Mortise Knob Lock, 3⅛ x 3¼, Brass Front, Iron Bolts, Brass Key	3.58⅓	3.00
0587	2004	Mortise Knob Lock, 3⅛ x 3¼, Brass Front, Brass Bolts, Brass Key	3.90	3.07½
0179	01½	Mortise Knob Lock, 4 x 3¼, Iron Front, Iron Bolts, Tinned Key	3.36⅔	2.50
0183	05½	Mortise Knob Lock, 4 x 3¼, Iron Front, Iron Bolts, Brass Key	4.20	3.12½
0181	03½	Mortise Knob Lock, 4 x 3¼, Iron Front, Brass Bolts, Brass Key	4.90	3.75
0185	13¼	Mortise Knob Lock, 4 x 3¼, Brass Front, Iron Bolts, Brass Key	5.83⅓	4.00
0187	2	Mortise Knob Lock, 4 x 3¼, Brass Front, Brass Bolts, Brass Key	6.53⅓	4.50
92	35	Sliding Door Lock, 5 x 3¼, Astragal Front, Brass Bolts, Brass Key	17.50	10.00
1611½	604	Horizontal Rim Dead Locks, 3 x 2, Iron Bolt and Key	.98⅓	.82½
1701½	605	Horizontal Rim Dead Locks, 3 x 2¼, Iron Bolt and Brass Key	3.33⅓	1.85
193	606	Horizontal Rim Dead Locks, 3¼ x 2¼, Iron Bolt and Iron Key	1.30	1.07½
195	607	Horizontal Rim Dead Locks, 3¼ x 2¼, Iron Bolt and Brass Key	3.85	2.25
163	612½	Horizontal Rim Dead Locks, 4 x 2½, Iron Bolt and Iron Key	3.15	2.25
171	612	Horizontal Rim Dead Locks, 4 x 2½, Iron Bolt and Brass Key	4.20	2.87½
0230	260	Horizontal Rim Knob Lock, 5 x 3½, Iron Bolt and Iron Key	4.20	2.50
0231	270	Horizontal Rim Knob Lock, 5 x 3½, Brass Bolt and Brass Key	6.65	4.00
0248	262	Horizontal Rim Knob Lock, 5 x 3½, Iron Bolts and Iron Thumb Bolts and Iron Key	5.25	2.87½
0235	272	Horizontal Rim Knob Lock, 5 x 3½, Brass Bolts and Brass Thumb Bolts and Brass Key	8.40	4.62½
1721½	2439	Horizontal Rim Store Door Dead Lock, 5 x 4, Iron Bolt, two Folding Keys	12.45	7.37½
472		Horizontal Rim Store Door Dead Lock, 6 x 4, Iron Bolt, two Folding Keys	13.15	9.25
468	2490	Upright Rim Store Door Dead Lock, 5 x 4, Iron Bolt, two Folding Keys	11.20	7.37½
419	2480	Upright Rim Store Loor Dead Lock, 6 x 3½, Iron Bolt, two Folding Keys	18.20	9.25
01	8603½	Upright Rim Knob Lock, 4 x 3¼, Iron Bolts and Iron Key	2.26⅔	1.87½
01½	8611½	Upright Rim Knob Lock, 4 x 3¼, Iron Bolts and Brass Key	3.20	2.50
01⅛	8621½	Upright Rim Knob Lock, 4 x 3¼, Brass Bolts and Brass Key	4.70	2.75
001	1850½	Upright Rim Knob Lock, 4 x 3¼, Iron Bolts and Iron Key	1.30	1.10
001½	1903½	Upright Rim Knob Lock, 4 x 3¼, Iron Bolts and Brass Key	1.95	1.55
001¼	866	Upright Rim Knob Lock, 4 x 3¼, Iron Bolts, Brass Key and Thumb Bolt	3.95	2.70
0001¼	867	Upright Rim Knob Lock, 4 x 3¼, Brass Bolts, Brass Key and Thumb Bolt	6.26⅔	3.20
218	410	Mineral Door Knobs, Japanned	.85	.75
238	310	Porcelain Door Knobs, Japanned	1.05	.87½
142	110	Porcelain Door Knobs, Electro-Plated Mountings	3.38⅓	2.62½
146	101	Porcelain Door Knobs, Electro-Plated & Porcelain Mountings	3.85	3.00

fine brass or copper wire in fastening samples on the outside of the boxes. We find we can save time by having goods sampled, for a customer can see in a short time what we have, and whether he can be suited from our stock. For instance, we use board ½ inch thick, 3 feet long and 2 feet wide on which to sample Locks, Rim and Mortise, Door Locks, Padlocks, Door Bolts, Cupboard Catches, &c. A board of that size takes up but little room.

Our correspondent whose letter we give below refers pointedly to extravagant and impracticable methods of handling Hardware, and gives suggestions which may be of service to some of our readers. His letter brings out again the point we have mentioned before that the circumstances in which each Hardware merchant is doing business will to a large extent determine the room he can advantageously occupy, and the expen e which he will be justified in incurring in conveniences for handling his goods. As our readers embrace all classes of Hardware merchants, from the retailer to the large jobbing houses, it is impossible to limit this discussion to any one class of dealers, but suggestions embodying the views and experiences of any methodical, enterprising and successful merchants, wholesale and retail, are sure to be of interest to others. And so we take pleasure in giving our correspondent's remarks:

I have read with much interest for the last few weeks communications from different parties about the arrangement of Hardware stores. While some of the suggestions seem practicable, others are ludicrous. Some with more money than experience come out with a store elaborately fitted, and describe rooms and plans which would all do nicely provided the room could be had. Of course in a country town room sufficient could be had, and a person could fit up an elegant store with all improvements and spend his money (provided he has it to spend) like a lord, and make arrangements to do a "land-office" business, and, after his trouble and expense, fill his princely palace with goods of the latest and best designs, and then what? Sit down and wait for customers who come not, because the place does not require so many or so expensive goods. Like the man who went into business with money but no experience, he would come out with experience but no money. I have no doubt all in the trade would be glad to have their store look nice and tidy, and have lots of room to show goods, but no one can plan for all, as all are not situated alike. It is all very nice to talk about high ceilings, broad moldings, elaborate racks and all that, if you have room, but, if not, what are you to do? In my case I have one of the best stands in town, and if I should be foolish enough to move from where I am now located some one would be wise enough to occupy the same place with the same business. My present showroom is 20 x 40 feet, with 9-foot ceiling, which is the best I can do at present. I have another showroom by crossing a 6-foot alley, and have plenty of room above for storage If any man can suggest some way to show goods satisfactorily I am willing to receive all the instruction I can get.

In an experience of 25 years I find no way of showing goods so well as by using wooden boxes on the shelves. Of course under the counter are drawers for such goods as do not need sampling. Strap and T and Plate Hinges are kept in rack, with space sufficient for three or four dozen Strap and T Hinges and 10 to 20 pairs Plate Hinges, surplus stock from necessity being kept up stairs and brought down as wanted. Wooden boxes made from $\frac{5}{16}$-inch pine can be made by any man who ought to be employed in a store of that kind, and during the winter months, when he would be only toasting his shins by the fire. So you see the expense is mere nothing. Use wire nails for putting together, and glue all corners. The front of boxes cover with green emerald paper. Then soak off the label from original package, whether box or bundle, and paste on front of box to suit taste. I make my boxes to suit the goods I wish to show, and by using screw hooks and screw eyes in different ways I leave the sample free to be removed, and in that way sell the sample every time, sampling again with a fresh article from inside the box. In your issue of the 17th of December I see a plan for keeping Screws which is very similar to what I have used for over 20 years, and I have failed to see anything in my experience equal to it. The Revolving Screw Case may be nice, but it must stand on the counter or somewhere so as to turn, and in that case every one who comes in has access to it and Screws are liable to get mixed. Besides, I have my boxes directly behind the counter, so two or three can sell at the same time. The American Screw Co. kindly furnished me labels for all the numbers I wanted, and I pasted them on the front of each box, so one can tell at a glance what box he wants to take down, and if not the right one it can be easily returned to place and another box taken down, and each kind kept separately. After a little time a man any way smart can tell by his eye very nearly what size is needed.

PRICES AND ITEMS.

The Withington & Cooley Mfg. Co., Jackson, Mich., announce, December 15, the withdrawal of all quotations on Steel Goods heretofore made, except as to Warren Hoes and Jackson (Fox) Lawn Rakes, and it is intimated that such additional orders as they may to a limited extent be able to execute they will entertain at revised quotations to be determined hereafter. The Iowa Farming Tool Co., December 15, also announce the withdrawal of their former quotations on Steel Goods, and intimate that they shall make an advance over late prices, governed in each instance by kinds and quantities required, and generally by the tone of the metal market. Both these houses announce that quotations on Snaths and Cradles remain unchanged. These announcements are regarded by the trade as indicating the tone of the market, in which a firm feeling prevails. Most of the manufacturers are well supplied with orders, and are reluctant to accept more at prices lately ruling. An effort is indeed reported to be on foot looking toward an advance.

There appears to be a tendency toward the sale of Solid Box Vises by the pound instead of at the regular list with discount. The comparison of the prices indicates that there is not much difference in the net, whichever way the goods are bought.

Bellows & Dickey, Cleveland, Ohio, issue an illustrated catalogue and price list of Metal and Rubber Stamps, which will be of interest to our readers. It covers their complete line of goods, with many illustrations showing the different styles of Steel Name Stamps, Monograms, Trade-Marks, &c. Stamps for raising letters on thin metal and on wood, Chilled Iron Letters and Figures, Branding Irons, Brass Stencils, Rubber Type, &c., which they manufacture.

In regard to Sauce Pans, Glue Pots, Enameled Kettles, Oval Boilers, &c., in which we recently noted an improved feeling, we have the pleasure of announcing an advance, with firm prices. It is understood that the business of Jones & Merritt, Auburn, N. Y., and of the Chemung Hollow-Ware Co., Elmira, N. Y., have been purchased by other manufacturers in this line, and that a combination which is regarded as strong has been formed, consisting of the following houses:

STANDARD MFG. CO., Pittsburgh, Pa.
PATTON MFG. CO., Columbus, Ohio.
STUART, PETERSON & CO., Philadelphia.
BARROWS, SAVERY CO., Philadelphia, Pa.
MARIETTA HOLLOW-WARE AND ENAMELING CO., Marietta, Pa.

The new prices are a decided advance upon the former, and the expectation is expressed that they will be maintained.

There are numerous indications of a better feeling, and in some cases of higher prices, in Heavy Hardware. Carriage, Tire and Machine Bolts, &c., are held firmly, and fewer manufacturers are disposed to take orders at prices lately ruling. Some of them have advanced their quotations and indicate a disposition to be cautious in accepting large contracts, even at present prices. An advance has also been made in Axles, and Springs are held with greater firmness. There has been no general change in the price of such cast-iron goods as Grindstone Fixtures, Coat and Hat Hooks, Barn Door Hangers, &c., but the Perin & Gaff Mfg. Co., Jeffersonville, Ind., have advanced beyond the extreme prices at which they have recently sold.

The address of Amos Sturts was given erroneously in the description of his Blind-Slat Holder, which appeared among the Novelties in our last issue. It should have been 1513 North Twenty-third street, Philadelphia, instead of the way it was printed. Our readers will please note the correction.

Notice is given, under date December 14, that the partnership heretofore subsisting between Wm. H. Frost and Charles Jones, Iron founders and manufacturers of Malleable Iron, Smith's Falls, County of Lanark, Ont., under the style of Frost & Jones, has been dissolved, the debts owing to the partnership to be paid to Mr. Frost, to whom also claims are to be presented. Mr. Frost announces that the business will be continued by him under the style of the Smith's Falls Malleable Iron Works.

In an announcement by J. S. Pruden & Son, New York, of the death on the 14th inst. of Joseph S. Pruden, the senior member of the firm, the following reference is made to his career and character: "Having devoted the last 20 years of his life to the business, and by his strict integrity, ability and faithfulness placed our house upon its present successful standing, we feel that all will join with us in deploring his death as a great loss, at the same time acknowledging that the lesson of his life should prove useful as a guide to many of us of younger years."

The Wire Goods Co., Worcester, Mass., issue a revised price list of Steel Wire Nails and Brads, which was adopted by the manufacturers November 11. Discounts are not given, but, to avoid misunderstanding about delivery, the company announce that on lots of 300 pounds or over they will allow the actual railroad freight to the nearest principal shipping point, such allowance never in any case to exceed 40 cents per 100 pounds. No express charges will be allowed under any circumstances, nor will allowance for freight be made on less than 300 pounds.

Ely Ransom and Charles E. Schou, comprising the firm of Ransom & Schou, are successors to E. Ransom & Co., Poughkeepsie, N. Y., having bought out R. L. Knight's interest.

The agreement by the manufacturers of Wire Nails is referred to as working satisfactorily, and the prices determined upon as being generally upheld. There are rumors to the effect that another advance may be anticipated before long, but this will probably be dependent largely upon the general course of the market and the condition of trade.

The death of James B. Ogden at his home in Brooklyn occurred on Monday, at the age of 59. Mr. Ogden will be remembered by many in the Hardware trade as having been manager of the Russell & Erwin Mfg. Co. 15 years ago, with a long and prominent previous connection with the house. For a number of years past Mr. Ogden has not been engaged in the Hardware business, and of late has been in somewhat feeble health.

THE MALLORY-WHEELER CO.'s REVISED LIST PRICES.

December 18, 1885.

No.	Per doz.
0	$0.98
1	6.75
01	3.75
001	2.20
01⅛	3.50
001⅛	4.15
01¼	4.75
x01¼	4.75
001¼	5.40
x001¼	5.40
0001¼	6.40
x0001¼	6.40
01⅜	5.25
001⅜	2.20
1½	8.00
01½	5.00
x01½	5.00
001½	3.10
0018	3.10
01¾	5.50
x01¾	5.50
2, 1 key	23.25
2, 2 keys	25.00
4	45.00
6	18.00
7	18.00
8	35.00
9	37.50
10	47.50
12	55.00
14	80.00
16, 1 key	23.00
16, 2 keys	24.75
16½	15.00
18	33.50
19	18.50
20	21.00
21	35.00
22	45.00
23	3.00
23½	4.50
24	37.50
25	3.75
25½	5.50
26	25.00
27	35.00
28	20.00
29	30.00
30	35.00
*30½	35.00
31	50.00
*31½	50.00
32, 2 keys	25.00
*32½, 2 kys	25.00
33, 2 keys	40.00
*33½, 2 kys	40.00
34	58.50
*35	63.00
36	78.50
*37	80.00
38	62.00
40	82.00
41	33.00
43	43.00
*47	66.00
*50	46.00
53	43.50
53½	61.00
55	33.50
Mineral Jap'd.	
56	30.00
White Jap'd.	
56	81.00
White Plated.	
56	34.50
57	6.00
*57½	7.75
*58	13.00
*58¼	14.25
*58½	16.00
*58¾	17.75
59	4.50
63	6.50
*63½	25.00
*64½	33.00
65	30.00
66	40.00
69	24.00
69½	30.00
70	30.00
70½	27.50
*71	17.25
*071	14.25
*0071	11 10
72	65.00
*72½	45.00
73	8.00
*73½	50.00
76½	35.00
77	9.00
77½	14.00
80	27.50
080	18.25
80½	26.50
080½	16.50
80¾	26.00
80⅞	24.75
82	15.50
83	12.75
83½	14.00
84	14.50
85	12.75
87	15.50
90	25.00
*91	19.00
*091	16.00
*0091	13.15
92	20.00
Brass, Per set.	
*93	13.50
Elec. or Nickel.	
*93	20.00
Brass,	
*093	5.00
Elec or Nickel,	
*0.3	10.00
0093	3.50
Brass,	
*93½	10.00
Elec. or Nickel,	
*93½	15.00
Brass,	
*093½	4.00
Elec. or Nickel.	
*093½	8.00
0093½	2.75
Per doz.	
94	15.00
*94½	18.00
Brass, Per set.	
*95	15.00
Elec. or Nickel.	
*95	22.00
Brass,	
*095	5.50
Elec. or Nickel,	
*095	11.00
Per doz.	
96	10.00
97	8.50
98	9.00
99	2.50
100	10 00
101	3.75
104	6.00
105	2.25
104	2.25
105	3.00
105½	3.50
107	11.00
109	4.00
0111	3.50
0111⅛	4.00
0111¾	5.00
112	4.75
0112	4.50
112⅛	5.25
0113, 1 key	5.00
0114, 1 key	6.00
115	14.50
0115, 1 key	7.50
0116, 1 key	9.00
117	16.50
0117, 1 key	6.50
0118, 1 key	8.00
Mineral Jap'd.	
*119	25.00
White Jap'd,	
*119	25.00
White Plated,	
*119	30.00
0119, 1 key	9.50
122	3.00
123	2.80
123½	3.00
124	5.00
125	15.50
126	25.00
127	8.00
128	13.00
128½	9.00
129	20.00
129½	7.00
130	15 00
130½	3.00
132	14.50
134	16.50
135	2.50
136	16.25
140	11.00
141	12.25
142	14.50
143	16.00
145	11.00
146	12.75
147	14.50
148	16.25
149½	12.25
150	14.00
151	16.00
152	17.75
153	40.00
153½	57.50
154	3.00
155	4.25
156	4.25
157	3.00
158	5.75
159	4.50
160	7.25
161	3.25
161½	1.65
162	9.50
162½	2.45
163	4.50
164	12.00
165	6.00
166, 1 key	18.00
166, 2 keys	19.75
167	8.00
168, 1 key	13.00
168, 2 keys	14.75
169	10.50
170, 1 key	21.75
170, 2 kys	23.50
170½	3.70
171	5.75
172, 1 key	16.75
172, 2 keys	18.50
173	7.25
174	15.50
175	9.50
176	17.00
177	12.00
178	13.75
178½	10.25
179	8.50
0179	5.00
180	14.50
180½	11.00
181	11.00
0181	7.50
x0181	7.50
*0181½	7.50
182	6.00
183	9.75
0183	6.25
x0183	6 25
*0183½	6.25
184	7.00
185	11.50
0185	8.00
x0185	8.00
*0185½	8.00
186, 1 key	10.75
186½, 1 k'y	5.75
187	12.50
0187	9.00
x0187	9.00
*0187½	9.00
188, 1 key	9.25
188½, 1 k'y	12.75
189	12.00
190	12.00
191	11.50
192	13.50
193	2.15
194	4.50
195	4.50
196	5.50
198	10 25
199	9.00
200	11.00
201	1.65
202	3.00
203	2.10
204	3.75
206	9.00
208	10.25
211	8.00
0211	5.00
00211	4.75
00211½	5.50
213	8.50
215	9.25
x215	9.25
0215	6.25
x0215	6.25
00215	6.00
x00215	6.00
02151/4	7.75
02151/4	8.00
x02151/4	8.00
2151/2	11.00
x2151/2	11.00
02151/2	6.75
x02151/2	6.75
216	1.50
217	9.75
x217	9.75
2171/2	12.00
x2171/2	15.00
02171/2	9.00
x02171/2	9.00
218	1.50
0218	1.50
219	12.00
220x220	2.25
2201/2	3.00
221	13.50
222x222	2.25
2221/2	3.00
225	10.25
0225	10.25
225	11.00
226	2.10
2261/2	2.10
0226	2.10
227	14.50
228	9.00
0228	9.00
229	16.50
230	9.75
231	11.00
x231	11.00
0231	8.00
x0231	8.00
02311/2	6.00
x02311/2	6.00
02312/2	7.50
x02312/2	7.50
233	14.50
x233	14.50
0233	11.50
x0233	11.50
235	12.25
x235	12.25
0235	9.25
x0235	9.25
02351/4	8.75
02351/4	8.75
02351/4	7.15
02351/4	7.15
236	1.75
236x236	2.50
2361/2	3.25
237	16.00
x237	16.00
0237	13.00
x0237	13.00
238	1.75
238	1.75
238x238	2.50
2381/2	3.25
239	8.00
0239	5.00
02391/4	4.00
02391/8	2.45
02391/2	4.50
02391/2	4.65
240	6.35
240x240	9.00
2401/2	10.50
241	11.50
0241	8.50
242	6.25
242x242	9.00
2421/2	10.50
243	8.75
0243	5.75
02431/2	5.25
245	12.25
0245	9.25
247	9.25
x247	9.25
0247	6.25
x0247	6.25
02471/4	5.00
02471/4	5.00
02471/2	3.35
02471/2	5.75
x02471/2	5.75
02475/8	5.65
x02475/8	5.65
248	7.00
248x248	10.00
2481/2	11.50
249	12.75
x249	12.75
0249	9.75
x0249	9.75
250	7.00
250x250	10.00
253	1.50
0253	1.53
2531/2	13.50
x2531/2	13.50
02531/2	10.50
x02531/2	10.50
254	1.75
255	1.75
0255	1.75
256	5 25
257	5.25
258	6.00
2581/2	2.10
2621/2	30.00
265	2.00
286	2.50
287	5.00
288	5.50
290	1.00
291	1.25
293	2.50
295	2.50
300	.75
302	.75
312	.50
3121/2	.50
313	.50
3131/2	.50
335	5.00
3381/2	5.00
374	4.75
377	1.50
380	1.50
381	1.50
3811/2	1.50
382	1.50
383	6.00
3831/2	6.00
398	2.25
402	8.00
404	8.00
406	2.75
*415, 1 key	23.00
*415, 2 key	24.75
*4151/4, 1 k.	18.00
*4151/4, 2 k.	19.75
*4153/4, 1 k.	13.00
*4153/4, 2 k.	14.75
*416, 1 key	23.00
*416, 2 key	24.75
*4161/2, 1 k.	18.00
*4161/2, 2 k.	19.75
*4163/4, 1 k.	13.00
*4163/4, 2 k.	14.75
*418	33.50
*419	18.50
*420	21.00
*421	33.50
*422	28.50
440	5.25
442	5.25
0442	5.25
444	6.00
446	6.00
0446	6.00
449	5.25
450	5.25
0450	5.25
*466, 1 key	18.00
*466, 2 key	19.75
*4661/2, 1 k	15.50
*4661/2, 2 k	17.25
*468, 1 key	13.00
*468, 2 key	14.75
*470, 1 key	21.75
*470, 2 key	23.50
*4701/2, 1 k.	18.00
*4701/2, 2 k.	19.75
*4711/2, 1 k.	15.50
*4711/2, 2 k.	17.25
*472, 1 key	16.75
*472, 2 key	18.50
*4721/2, 1 k	13.00
*4721/2, 2 k	14.75
474	.75
475	.75
*480	65.50
*482	89.00
*484	49.50
*485	25.00
*486	69.50
*487	18.00
*488	19.75
*489	21.50
495	.75
497	18.00
*500	30.00
*501	32.50
*502	35.00
*503	35.00
*504	40.00
*505	45.00
*506, 1 k.	23.25
*506, 2 k.	25.00
*5061/2, 1 k.	25.75
*5061/2, 2 k	27.50
*5063/4, 1 k.	28.25
*5063/4, 2 k.	30.00
*507	30.00
*508	35.00
*509	37.50
*510	47.50
*511	42.50
*512	55.00
*513	50.00
*520	30.00
*521	35.00
*522	45.00
*523	35.00
*524	40.00
*525	40.00
*526	45.00
*527	50.00
530	3.25
531	4.50
532	6.25
533	2.50
534	4.00
*541	33.50
*543	46.50
*555	43.50
*554	61.00
555	27.50
5551/2	25.75
5553/4	24.00
556	23.50
5561/2	21.75
5563/4	20.00
*566, 1 key	18.00
*566, 2 kys	19.75
*5661/2, 1 k.	15 50
*5661/2, 2 ks	17.25
*568, 1 key	13.00
*568, 2 kys	14 75
574	15.50
576	17.00
578	13.75
579	7.25
0579	3.75

All numbers with an x prefixed have Bright Finished Iron Keys. Those with an asterisk (*) have Nickel Keys.

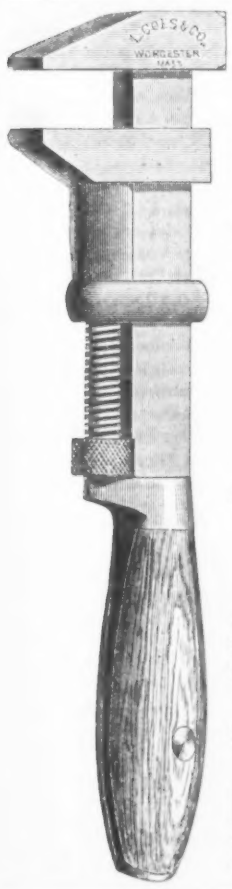
No.	Per doz.
00579	2.20
580	14.50
581	9.00
0581	5.50
x0581	5.50
*0581½	5.50
582, 1 key	10.75
583	8.25
0583	4.75
x0583	4.75
00583	3.10
*0583½	4.75
584	9 50
0584	6.00
x0584	6.00
*0584½	6.00
585	18.70
587	9.65
0587	6.15
x0587	6.15
*0587½	6.15
588, 1 key	9.25
589, 1 key	12.25
590, 1 key	10.75
592, 1 key	14.50
593, 1 key	13.00
594, 1 key	6.50
595, 1 key	5.00
600	12.50
0900	12.50
601	13.50
602	11.00
0602	11.00
603	12.00
604	18.00
605	20.00
606	25.00
608	27.50
620	14.50
621	15.75
622	11.00
623	12.75
624	18.00
625	19.50
626	14.50
627	16.25
628	12.75
629	14.00
630	16.25
631	17.75
632	11.75
633	13.50
634	15.25
635	17.00
665	35.00
666	42.00
671	9.00
6711/2	10.75
672	10.50
6721/2	12.25
675	9.50
6751/2	11.00
676	10.50
6761/2	12.00
677	11.50
6771/2	13.00
678	12.50
6781/2	14.00

With No. 290 Thumb Knobs.		Per doz.
686		9.50
687		10.75
688		11.00
689		12.00
696		6.50
697		7.75
698		8.00
699		9.00
686		10.00
687		11.25
688		11.50
689		12.50
696		6.75
697		8.00
698		8.25
699		9.25
686		12.50
687		13.75
688		14.00
689		15.00
696		8.00
697		9.25
698		9.50
699		10.50
686		12.50
687		13.75
688		14.00
689		15.00
696		8.00
697		9.25
698		9.50
699		10.50

With No. 295 or with No. 1398 Thumb Knobs.		Per doz.
720		5.50
721		6.00
722		6.50
723		7.00
*700		32 50

Swivel Spindles, $3.00 per dozen.

No.	Per doz.
*701	27.50
*702	21.00
*703	19.75
714	3.50
715	5.00
716	9.00
755	57.50
755	54.50
*755½	43.00
*0755½	10.00
756	61.00
0756	58.00
*756½	46.50
*0756½	43 50
757	64.50
0757	61.50
758	75.00
*758½	62.50
759	78.50
*759½	66.00
760	82.00
*761, 1 key	20.50
*761, 2 kys	22.25
*762, 1 key	23.00
*762, 2 kys	24.75
*766, 1 key	24.25
*766, 2 kys	26.00
*767, 1 key	26.75
*767, 2 kys	28.50
*771, 1 key	20.50
*771, 2 kys	22.25
*772, 1 key	23.00
*772, 2 kys	24.75
*782, 1 key	26.75
*782, 2 kys	28.50
*783, 1 key	31.75
*783, 2 kys	33.50
*785	35.00
*825	11 00
*826	12.75
*827	11.50
*828	13.25
*829	12.75
*830	14.50
*831	13.75
*832	15.50
841	3 50
*842, 1 key	4.50
*843, 1 key	5.00
*844, 1 key	5.50
*845, 1 key	6.00
*846, 1 key	6.50
*847, 1 key	7.00
851, 1 key	3.70
852, 1 key	4.20
853, 1 key	4 70
854, 1 key	5.20
855, 1 key	5.70
856, 1 key	6.20
*900	27.25
*9003½	30.00
*901	28.50
*9011½	21 25
*902	31.00
*9021½	22.50
*903	33.50
*9031½	25.00
*907	27.00
*9071½	19.50
*908	30.50
*9084½	23.00
*910	30.00
*911	33.50
*915	50.00
*9151½	37.50
*916	53.50
*9161½	41.00
925	10.25
926	12.00
927	11.00
928	13.50
980	45.00
*9301½	35.00
931	48.50
*9311½	38.50
932	52.00
*938	65.50
*940	85.50
*947	69.50
*950	49.50
953	37.25
0953	34.25
*9531½	27.50
*0953½	24.50
954	38.50
9541	35.50
*9541½	28.75
*0954½	25.75
955	40.00
0955	37.00
*9551½	30.00
*0955½	27.00
956	43.50
0956	40.50
*9561½	33.50
*0956½	30.50
957	47.00
0957	44.00
986	15.50
987	14.50
988	14.00
989	12.75
991	11.50
993	8.50
9931½	9.75
994	7.25
9941½	8.25
*995	8.25
*996	9.00
*997	9.50
*998	9.65
*999	9.75
*1000	11.00
*1001	11.50
*1006	12.50
*1011	12.75
*1012	14.00
*1013	14.50
*1018	15.50
*1021	25.00
*1022	20.00
1023	8.00
1023½	8.50
1025	9.25
1026	11.00
1027	9.75
1028	12.00
1029	9.25
1030	11.00
1031	12.75
1032	14.50
1033	10.00
1034	12.25
1035	13.50
1036	16.00
1053	25.00
1054	26.75
1055	28.50
1056	30.00
1057	31.75
1058	33.50
1059	37.00
*1060, 1 k.	6.50
*1061, 1 k.	8.00
*1062, 1 k.	9.50
*1063, 1 k.	7.00
*1064, 1 k.	8.50
*1065, 1 k.	10.00
1174	6.00
11741/2	10.00
1175	6.00
11761/2	10.00
1190	6.15
1191	6.15
1192	10.15
1193	10.15
1196	10.15
1197	10.15
1223	7.50
12231/2	6.50
1224	7.50
*1902	21.75
*19023/4	20.65
*1903	23.50
*1904	25.25
*1915	20.25
*19151/2	22.00
*1916	28.00
*19161/2	21.00
*1917	32.75
*19171/2	25.50
*1918	31.50
*19181/2	24.50
1935	10.25
1936	12.00
1937	11.00
1938	13.25
*1942, 1 k.	5.50
*1943, 1 k.	6.00
*1944, 1 k.	6.50
*1945, 1 k.	7.00
*1946, 1 k.	7.50
*1947, 1 k.	8.00
1982	19.15
1983	20.25
1986	26.25
1987	28.15
1997	11.25
1998	13.00
1999	12.00
2000	14.50
*2001	9.30
*20011/4	11.05
*20013/4	12.80
*2002	8.90
*2003	11.75
*20031/4	13.50
*20033/4	10.65
*2 03 3/4	15.25
*2004	14.75
*20041/4	16.50
*20 04 3/4	18.25
*2005	13 65
*2006	19.25
*2007	18.15
2010	3.25
2011	3.50
2012	3.25
2013	3.50
2014	4.25
2015	4.50
2016	4.25
2017	4.50
2018	3.50
2020	3.50
2022	4.50
2024	4.50
2027	6.50
2029	5.50
2030	.40
20 31 1/4	.40
2031	.40
20311/2	.40
2032	.40
20324/5	.40
2033	.40
2034	.40
2040	.75
20401/2	.75
2041	.75
20411/2	.75
2042	.75
20421/2	.75
2060	6.00
3061	3.00
20611/



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GENUINE IMPROVED

Knife Handle

PATENT

Screw Wrenches

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Registered March 31, 1874.

Sectional view illustrates our NEW KNIFE HANDLE, showing Malleable Iron Frame and Shank of Bar keyed into position.

☞ *Straight Bar, Extra LONG NUT FOR SCREW IN JAW.*

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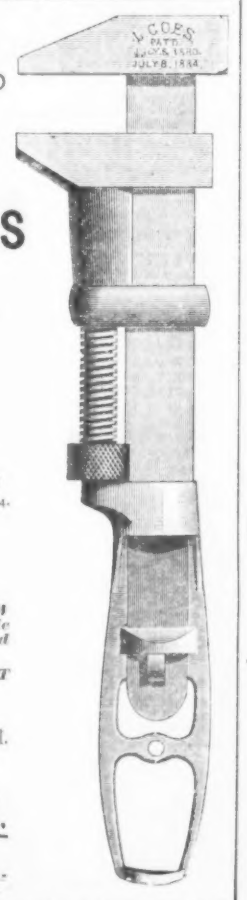

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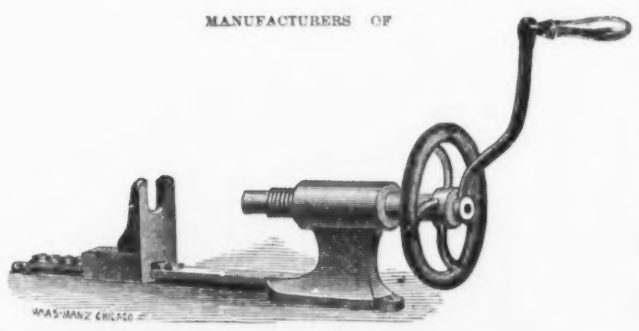

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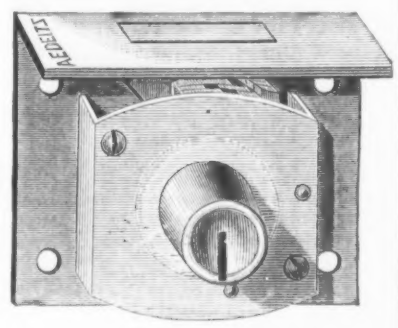

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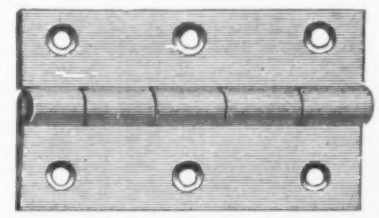

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EGG BEATERS.

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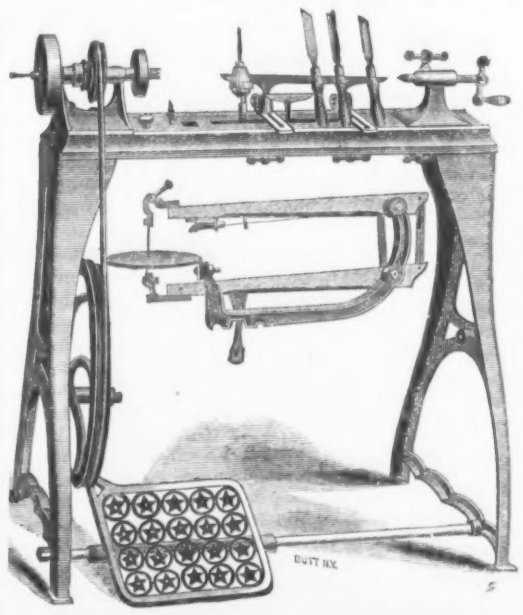
As seen in this Cut, to our Line of SCROLL SAW SUPPLIES for the coming year.



It is by far the best Lathe in market. We have also made great improvements on the

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Another generation of boys is coming to the front, so that the demand for these Saws is fast increasing, and seems likely to be as large as it was eight years ago. Dealers can increase their fall trade by laying in a stock.

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Scroll Saw Attachm't, extra	2.00.
Lester Saw and Lathe	10.00.
Rogers Saw, No. 1	3.50.
Cricket Saw, all Iron	2.50.
Bracket Sets, Nickel Plated, per doz	15.00.
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We are headquarters in New York for Wood, Designs and supplies of all kinds for bracket sawyers. Our Star Bracket Blades are superior to any others in use, and are in demand in many other countries.

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All the employees of P. & F. Corbin, New Britain, have been served with their two weeks' notice. It has been the custom in some of the factories to rehire the help under new contracts with the first of every year, but the plan has not heretofore been followed at this factory, and there is considerable conjecture as to what will be the outcome.

MASSACHUSETTS.

Steps have been taken to incorporate the new process Twist Drill Co. at Taunton.

There is said to be a strong desire on the part of some of the owners of the Old Colony Iron Works to have the whole concern moved to Somerset. Others who hold the balance of power will see that the location is East Taunton for some time longer.

The United States Watch Factory, at Waltham, are rapidly making preparations to manufacture their watches. During a whole year past tools have been in process of manufacture, and Wednesday two women operatives were put to work. A few watches will be made this winter, and in the spring the factory is expected to be in full running order.

The furnace at Colby's Iron Works, Pittsfield, started last week for the first time in nearly two years.

NEW JERSEY.

The extensive works of the Singer Sewing Machine Co., at Elizabeth, closed down last week. At this time of the year these works employ between 3000 and 3500 men, and disburse $35,000 to $40,000 per week in wages alone to the laboring people residing there. The shutting down was because of a levy on the property of the company to satisfy judgments for taxes amounting to $45,000, which the company refused to pay on the ground of a counter claim against the city for about $750,000 for money loaned the city authorities at various times since 1876 to help them in their municipal difficulties.

The Boonton Iron Works, which have been idle 12 years, are to start up with 25 nail machines as soon as nail plates can be secured.

The Ferracute Machine Co , of Bridgeton, are putting in a new 60-horse-power steel boiler, which will give them the power needed for considerably enlarging their factory, which they intend to do soon. Among the new tools to be put in will be a special boring mill and several special machines. The new Ferracute punching presses are meeting with considerable favor on account of their superior design, great weight and strength. Among the orders which they have lately received is one from Germany.

PENNSYLVANIA.

Furnace No. 1 of the Stewart Iron Co., at Sharon, was blown in on Saturday evening, the 12th inst., and is now, with their other furnace, in full operation. Both furnaces turn out from 160 to 170 tons of metal each day.

P. L. Kimberly & Co.'s Etna Nail Factory, at New Castle, made 4583 kegs of nails week before last, the largest output ever made by that factory.

The Tyrone Iron Co., at Tyrone, have purchased the Tyrone Forge, and will operate it in the future.

The Reading Iron Works have secured the contract for furnishing the Lauer Brewing Co., of Reading, with an ice machine. Between 15,000 and 20,000 feet of pipe will be required. The machine will cost about $20,000.

A company have been formed at Sharon to start a nail mill in Parkersburg, W. Va. The mill will be run on the co-operative plan if built. It is said that the Parkersburg citizens will make liberal donations to have the mill erected there.

It is rumored that Wheeling parties have secured a lease of the new nail factory at Sharon, and will start it up before January 1.

The large blast furnace of the Chester Rolling Mills, idle since August, 1884, will be blown in about January 1. About 150 hands will be given employment. John Roach is the principal stockholder in the company.

The Harrisburg Car Co. have received an order from the Delaware and Hudson Railroad Co. for 250 freight cars.

The Allentown Iron Co. will blow in another furnace in a few days.

The Stainer Engine Co., of Erie, have been chartered to manufacture machinery, engines, boilers, &c., with a capital stock of $80,000.

The works of the Allentown Rolling Mill Co. started up on Monday, the 21st inst.

The tilting steel converter with horizontal tuyeres erected at one of the furnaces of the E. & G. Brooke Iron Co., Birdsboro, having proved a complete success, another converter of the same kind is being built. The company have contracted with J. P. Witherow & Co., of Pittsburgh, to erect an iron building and furnish the second converter, with hydraulic cranes and other machinery required for a steel plant. Mr. Dods, the inventor, has taken out a patent for this style of converter, and this patent he has transferred to the owners of the Clapp-Griffiths patents. The steel plant of the E & G. Brooke Iron Co. is composed of tilting Bessemer converters.

The Conshohocken Tube Co., at Conshohocken, are building an extension to their works. A new furnace and engine are to be put in for the manufacture of smaller sizes of pipe. The company will increase their capital to $200,000.

Sharon Furnace, of Messrs. Boyce, Rawle & Co., blew in on the 15th inst. It has been out of blast for three months.

P. L. Kimberly & Co., have begun the erection of another furnace alongside of their Etna Furnace, at New Castle. It will be one of the largest furnaces in either valley, the intention being to build it 75 feet high, with 16 feet bosh. It will be built as rapidly as possible.

PITTSBURGH AND VICINITY.

The new steel nail factory of Chess, Cook & Co., at Rankin Station, will soon be ready for operations.

A new fruit-jar manufacturing company, with a capital of $100,000, is being established on the Southside. It will be a branch of the Consolidated Fruit-Jar Co., of Brunswick, N. J.

The Doyle Glasshouse, which has been lying idle several years, has been bought by the Phœnix Glass Co., of Phillipsburg. Mr. Andrew Howard, president of the Phœnix Co., says they may operate the Doyle factory next spring.

Messrs. Brown & Co., of the Wayne Iron Works, put their mill on double time last week. This is the first time this mill has run double time for three years.

The National Foundry and Pipe Works, at Scottdale, is almost completed. The company are making their own castings now. They expect to be able to make about 30 tons of pipe by the middle of January, and will increase their output to from 50 to 75 tons. The ground procured by the company is 3½ acres, and the works will be extended as it is found necessary.

The Hartman Steel Co., Limited, at Beaver Falls, have discharged a number of their men who lately joined the Amalgamated Association, and have employed non-union men in their places.

William McCully & Co. have started up their green bottle glass factory on the Southside with non-union men.

Mackintosh, Hemphill & Co., Pittsburgh, have filed a bill in equity in Common Pleas No. 2 against the Oliver & Roberts Wire Co. The plaintiffs claim $13,636, for which they hold a mechanic's lien on the property, and ask for a commission to take certain testimony necessary for the protection of the lien.

The National Tube Works Co., of McKeesport, have contracted to furnish the city of Charleston, the new capital of West Virginia, with the entire pipeage and tubing necessary for its new water works system.

A charter was last week issued to the River Coke Co., of Pittsburgh, for the purpose of mining and manufacturing coke and delivering the same, with the right to purchase and hold land for that purpose. The capital stock is $200,000, divided into 4000 shares of $50 each. The stockholders are A. W. Potter and R. C. Hannah, of Chicago, 1975 shares each; E. C. Potter and W. H Hannah, of Chicago, 10 shares each; R. F. Ramsey, Jr., J. H. McCreary and William McCreary, of Allegheny, each of whom hold 10 shares. The treasurer is John H. McCreary, of Pittsburgh.

Messrs. Harbison & Walker, fire-brick manufacturers, of Pittsburgh, have enough orders ahead to keep them busy for six months.

Benjamin Louth, Sr., of Pittsburgh, the inventor of the process of making nail plate out of old steel rails, has sold the right of his patent to a syndicate of five Eastern firms. Mr. Louth claims that by his process at least $10 a ton can be saved on the manufactured product, as compared with the present modes of production. In consideration of allowing the syndicate the sole right to use the process, Mr. Louth will receive $150 a day for one year and $300 a day for the remaining 16 years of the life of the patent.

Messrs. J. H. & W. H. Shields have completed their arrangements for the location of a large plate-glass factory at Butler. The new works will occupy 20 acres of ground. The buildings will be over 400,000 square feet in dimensions, and will be fire-pooof. Employment will be given to about 300 men. The two gentlemen most largely interested are from the Pittsburgh Plate Glass Works, at Creighton, and the Depaw Works, at Albany, Ill.

A company of New York capitalists are now negotiating for the purchase of the Pittsburgh Chain Works property, at New Brighton, for the purpose of establishing a ferroline or obsidian factory, with a capital stock of $200,000. Dr. Enrico Rosenzi, the patentee, has gone to New York to complete arrangements for the new enterprise.

The Standard Oil Co., who contemplate piping natural gas to Buffalo and Philadelphia from the gas wells in the vicinity of Pittsburgh, have placed some very large orders for gas-pipe in Pittsburgh, the Pennsylvania Tube Works alone receiving an order for 80,000 tons.

DELAWARE.

The Pusey & Jones Co., of Wilmington, have secured a large contract for machinery, and are engaging all the workmen out of employment, promising to keep them busy during the winter.

OHIO.

The tool works at Leetonia were sold at public sale last Saturday; $7550 was the amount paid. Mr. Briggs, the purchaser, will remove the building and machinery to Findley at an early day. This tool company failed in April last, with liabilities amounting to $30,000.

A number of nailers and others have organized a company to start a co operative nail factory in Bellaire. The capital stock is $80,000, and a charter has been applied for. About half the stock is already subscribed. It is proposed to start with 40 nail machines.

The Thomas Furnace, at Niles, is ready to blow in.

The William Anson Wood Mower and Reaper Works, Youngstown, have purchased the Remington Plow Works, formerly of Ilion, N. Y., and will add to it their already extensive establishment. They expect to turn out during the coming season from 5000 to 7000 plows. This new industry will give employment to a large number of men when in full operation.

Hannah Furnace, in the Mahoning Valley region, blew in on the 13th inst.

An examination of the lining of the Struthers' Furnace, recently leased by the Ohio Iron and Steel Co., Younstown, has been made, and it was found in good condition. A large force of men has been at work, and the furnace will be ready to blow in very shortly.

The new co-operative nail factory being erected at Steubenville will be ready for operations about January 10th, 1886.

INDIANA.

The Terre Haute *Express* of Thursday, the 17th inst., has the following: "The new nail mill company were given an intimation a few days ago that the Terre Haute Iron and Nail Works would entertain negotiations looking toward the sale of the works to the new company. The new company appointed a committee to confer with the Nail Works Co. The company met Mr. Nippert and other stockholders Tuesday, and were informed that the works would be turned over to the new company for $150,000. They stated to the company that the mill cost $260,000, and that they looked on the offer as very reasonable. The committee have reported to the stockholders of the new company, but the proposition is not received favorably. The members of the new company say that the machinery is greatly reduced in price, and that they can duplicate the Terre Haute Iron and Nail Works for less money."

MICHIGAN.

The Phœnix Wire and Iron Works are a new company formed to carry on the business of the E. T. Barnum Wire and Iron Works, of Detroit, recently destroyed by fire, until their legal complications are settled and a reorganization effected. They announce that they are now ready for business.

MISSOURI.

On the 8th inst. Fairbanks & Co. closed a contract with the Moberly Electric Light Co., of St. Louis, for two 45-horse-power Westinghouse automatic engines, two steel boilers, a 100-horse-power National heater, and a 4½ x 2¾ x 4 duplex steam pump.

The Missouri Malleable Iron Co., of St. Louis, are crowded with orders, and are running 10 hours a day. They are recipients of a contract from the Indianapolis Malleable Iron Co. for over 100 tons of malleables.

The Collier Shot Tower Co., St. Louis, are running two 12-hour turns a day, turning out an average of 100 bags of shot an hour. Since the latter part of August the demand for shot has been simply enormous. In September they shipped 35,000 bags, equal to 437.5 tons.

J. W. Garrett & Co., brass foundrymen, St. Louis, have completed an order from the Litenfield (Ill.) Car Co. for 6000 railway axle bearings. The company are now introducing a new combination bearing, the shell of which is wrought iron, the intermediate piece brass, and the wearing surface babbitt metal. The claim put forward on behalf of this bearing is that it is cheaper than other inventions in its line—in this particularly, that the shell can be refilled whenever the other metals have worn down, effecting a saving of its entire first cost. The St. Charles Car Co. have ordered 500 of the new bearings in the way of an experiment, and some of the railways have given small trial orders.—*Age of Steel.*

It is said that the Duggan-Parker Hardware Co., St. Louis, will increase their capital stock to $250,000.

The Helmbacher Forge and Rolling Mills, St. Louis, have contracts enough ahead to keep them working for several months.

The Hall & Brown Machinery Co., at St. Louis, are introducing a new style of re-sawing machine. They are extra large, weighing about 5000 pounds.

The St. Charles Car Mfg. Co. have just received orders from the Atchison, Topeka and Santa Fé Railroad to build 250 coal, 200 stock, 150 flat, 100 box and 12 caboose cars. This, with the repairing of cars on hand, will keep them running steadily all winter.

Messrs. M. Bare & Co., Hamilton, manufacturers of hand agricultural implements, report themselves as sufficiently full of orders to keep them busy until May, 1886 They are operating their plant day and night until 10 o'clock, and their season's output of hoes alone will amount to over $30,000.

ILLINOIS.

The nail mills of the Calumet Iron and Steel Co.'s Works, at Cummings, are now in active operation, with a force of 60 men.

KENTUCKY.

The Norton Iron Works, at Ashland, in one week turned out 3838 kegs of steel nails.

TENNESSEE.

Rockwood Furnace No. 1, the property of the Roane Iron Co., at Chattanooga, has been undergoing extensive repairs for several weeks and will blow in shortly.

On November 27 the Chickasaw Iron Co., Memphis, cast the largest pattern ever turned out of Memphis. It was a shaft for the Merchants' Cotton Press and Storage Co., and weighed about 9½ tons.

ALABAMA.

The Smith Sons' Gin and Machinery Co. and the Southern Bridge Co. have both bought lots of the suburban property of Avondale, at Birmingham, and will build at once.

The Pratt Saw Mill Co. have now on foot a 4-mile extension of their 10-mile railroad from their mill at Verbena into the woods. It is now proposed to use a wooden rail, the contrivance of a native, on the projected railroad from Hayneville to Montgomery. The cost of the road will not exceed $1000 a mile, it is said.

Alice Furnace No. 2, at Birmingham, which has undergone a general overhauling, will be ready to go into blast again in a few days.

Work is progressing steadily on the Woodward Iron Co.'s second furnace, near Birmingham. The same concern's No. 1 has been in blast continuously ever since she was built some 2½ years ago.

The Calera Land Co., having employed an engineer, announce that they will at once set about building up their town by creating employment for newcomers instead of by selling lots.

The Pratt Coal and Iron Co.'s furnace, now making at Birmingham, to be erected near there, will be the largest in the South. It will admit of a 20-foot bosh and will have a capacity of 150 tons of iron a day.

METALLURGICAL.

Changes in the Texture of Steel Through Heating and Cooling.

Jern Kontoret's Annaler has recently published the records of a series of experiments made by J. A Brinell to trace the effect of heating and cooling upon the texture of steel. A German translation of this article may be found in the November issue of *Stahl und Eisen*. We must confine ourselves to reproducing simply the conclusions which Brinell reaches, prefacing it with the explanation that he follows Rinman in designating as "cement" carbon that form of carbon which exists in unhardened steel, and as "hardening" carbon that modification which exists in hardened steel. This distinction has become familiar to English-speaking metallurgists through Professor Akerman's paper before the Iron and Steel Institute. Brinell's conclusions are:

1. If steel loses its coarsely crystalline texture without mechanical work having been into it, this is always due to a change of the carbon from cement to hardening carbon or *vice versa*, and the cause for the destruction of the coarsely crystalline structure must be sought in the change of the modification of the carbon.

2. It is only when the change in the condition of the carbon occurs during heating that the coarsely crystalline texture disappears in a more extensive manner. It is complete only when, through heating, the cement carbon is converted into hardening carbon. Accordingly, even very coarsely crystalline steel, hardened or unhardened, loses its texture completely as soon as the heating has been driven to a point which suffices to change the cement carbon to hardening carbon.

3. Steel carried to a white heat, if its carbon is to be changed to cement carbon, must slowly cool to a lower temperature than that to which unhardened steel must be carried in order to alter its carbon to hardening carbon.

4. The change from cement carbon to hardening carbon takes place very rapidly if the temperature is high enough. On the other hand, the alteration of the hardening carbon goes only more slowly during a greater part, both of the period of heating and the period of cooling.

5. The change from hardening carbon to cement carbon is always accompanied with a development of heat, and it is probable, therefore, although I could not observe it, that the change from cement carbon to hardening carbon calls for an absorption of heat.

6. If the hardening carbon during heating or cooling changes to cement carbon, completely or in greater part, then crystallization takes places suddenly, causing a correspondingly greater or less coarsely crystalline fracture as the previous texture of the steel was more coarsely crystalline.

7. Rapid cooling never causes a fine-grained fracture in a steel which was coarsely crystalline immediately previous to the act of cooling, but it does prevent the development of a crystalline structure in a steel which was either amorphous or melting when the cooling was started. Rapid cooling, in other words, only fixes the texture which the steel possessed just before the act of cooling.

8. In order to convert hardening carbon into cement carbon requires time as well as the proper temperature, while, on the contrary, the change from the cement carbon to hardening carbon seems to depend exclusively upon the degree of temperature. The result is that rapid cooling is capable of preventing the change from hardening to cement carbon.

9. The crystallization of steel, too, requires time as well as a certain temperature. If the duration of the cooling period is cut short by immersion in water or by other means, then the development of crystals is either lessened or entirely stopped.

The Davis-Colby Ore Roaster at the Katahdin Works.

Mr. O. W. Davis, Jr., general manager of the Katahdin Charcoal Iron Co., of Bangor, Me., writes us as follows:

We have recently rebuilt our Katahdin Works—destroyed by fire in 1882—and have added to the plant a new ore roaster embracing some improvements over our old one. The result proves that one long-sought point is gained—viz., to be able to thoroughly and uniformly desulphurize iron ores carrying from 1 to 5 per cent. of sulphur at a very moderate cost. Our Davis-Colby kiln is simply a Westman kiln with a hollow pier or flue in the center, in which flue are openings opposite the fire-arches, through which the sulphur is drawn and escapes up the main chimney. The Westman kiln as used in Sweden and on the Continent is a hollow shaft about 20 feet high and 18 feet in diameter at the bottom and 10 to 12 feet at the top. About 5 feet from the bottom are fire-arches opening directly through the wall into the center of the shaft. Below the fire-arches are doors, half in number, through which the ore is drawn out. The ore is fed into the top and gas enters at the fire-arches and ascends through the ore, being drawn by the high stack on top. The ore passes by the fire-arches and is drawn out at will from the bottom doors. The objection to this Westman kiln is that in case of fine ores it it impossible to get sufficient draft, and even when in case of coarse ores draft is attained the escaping sulphur condenses and falls back upon the ore. This objection was removed to some extent in Austrian practice by introducing a solid cone into the center of the kiln, which was a move in the right direction, but did not go far enough.

Our improvement consists in a hollow flue built of fire-brick blocks, in which is left a series of openings. The ore is fed into the top through a bell and hopper, the stack being supported by iron braces and the bell being cast hollow, so that it slides up and down on the stack, 34 inches in diameter. This hollow pier or flue is built from the bottom on the inside of the kiln, and of such size that the annular space between its outer wall and the inner wall of the kiln is but 24 inches at the level of the fire-arches, decreasing to 18 inches at the top. This annular space is occupied by the descending ore. The gas enters through a circular flue which is built into the kiln wall. It takes fire in the fire-arches and is drawn through the ore into and through the openings in the central flue, through which it escapes into the chimney. The heat in front of the fire-arches is intense, and none of the ore can pass through this space without reaching a white heat, at which point it parts with the last atom of sulphur. The advantage of this kiln is that the operation is entirely under the control of the workmen, and the sulphur, after it is once liberated from the ore, passes directly into the chimney and does not fall back upon the ore, while its construction admits of a vigorous draft even with fine ores.

Our furnace is run with water-power and supplied with a new 30-pipe Cooper-Durham hot-blast stove and the new Davis-Colby kiln. Gas is taken by a 36-inch down-comer from under the Weimer bell and seal, and carried to the ground, a part going direct to the hot blast and the balance to the ore kiln. Our ore contains 2 to 4 per cent. of sulphur, all of which is practically removed by the process, so that our iron, with only 10 per cent. of limestone for flux, contains from 0.03 to 0.07 per cent. of sulphur. The ore is landed on a platform, level with the top of the kiln. Two men on each shift sort and break it to reasonably uniform size and feed it into the bell. A valve controls the inlet of gas, and three men attend to the fire-arches, draw the ore and wheel it to the stockhouse. We are at present roasting 50 to 60 tons of ore daily in this manner in one kiln, and paying the 10 men $1.25 per day each, or $12.50 per day, which is the entire cost of the process. The resulting product in the blast furnace is first-class car-wheel iron, of great strength and high-chilling property, that commands the highest price.

The Progress of the Basic Process.

Mr. Percy Gilchrist sends us the following figures as illustrating the growth of the basic process in Europe during the year ending September 30, 1885:

The total make of steel and ingot iron made from phosphoric pig during this period amounts to 945,317 tons, being an increase over the make for the previous 12 months of about 10 per cent. It is noticeable that of this make no less than 600,183 tons were ingot iron containing under 0.18 per cent. of carbon, used for wire, sleepers, tin plates, tubes, boiler and ship plates, &c. The makes of the various countries are as follows:

	Tons.	Tons under 18 per cent. carbon.
England	145,707	70,803
Germany and Austria	617,514	424,862
France	130,582	62,390
Belgium and other countries	51,514	42,118
Total	945,317	600,183

In the last report of the American Iron and Steel Association the total make of steel in Europe, taking the latest data available, was 4,202,063 tons. From the data there published it is shown that in England only about 8 per cent. of the total product is basic steel, while in Germany it is fully 60 per cent., and in France more than 25 per cent. In this country not a single ton of basic steel was produced since the experiments made by the Pennsylvania Steel Co.

Consul-General Waller, at London, has made an elaborate report to the State Department in regard to the commerce and condition of trade of Great Britain and Ireland for the year ended September 30, 1885. The population of the United Kingdom is 36,325,115—an increase of 303,250 over 1884. The total wealth of the nation amounts to $43,600,000,000, allowing about $1245 to every man, woman and child, or about $300 more than such a division in the United States would produce. While the savings banks' returns indicate the comparative prosperity of a thrifty class, whose annual savings average from $25 to $50 per annum, still the pecuniary condition of a large part of the population is exceedingly distressing. Statistics show that one out of every 36 residents are registered as paupers. The poverty is undoubtedly greater than has ever been experienced in the United States. While one-tenth of the population are engaged in agriculture, one-fifth of the area of England is held by 523 proprietors, one-fourth of Scotland by 12 and one-third of Ireland by 292. The value of the average agricultural produce is variously estimated at from $750,000,000 to $950,000,000.

Wilkesbarre, Pa., has enormous stores of culm, the refuse of the coal breakers, which is being utilized to an increasing extent in the generation of steam. A wire-rope manufactory located there have screened culm delivered to them at 80 cents per ton. They have four engines and boilers, aggregating 350 horse-power, in constant operation, and their fuel costs them about $5 a day. The screened culm is called "bird's-eye" coal, and is still smaller than the buckwheat, the smallest of the merchantable sizes. If they used culm exclusively it is calculated that they would have power at a cost of $1.87½ per day, and, according to estimates at the axle works, the saving in the fuel will of itself pay a liberal dividend on the investment.

The Central Pacific Railroad Co. are now using 140 barrels of fuel oil on their steamers and in their shops, and thus far the experiment has proved eminently successful, besides affording quite a saving over the cost of coal. The railroads now pay $1.70 a barrel, and two and a half barrels are called equal to 1 ton of coal in heating capacity. By a new process 60 gallons are made the equivalent to a ton of coal, as claimed by the inventor.

Current Hardware Prices, December 23, 1885.

HARDWARE.

Ammunition.
Caps, Percussion, ₩ 1000—
Hicks & Goldmark's
F. L. Waterproof, 1-10's..50¢
E. B. Trimmed Edge, 1-10's..65¢ } dis 25@
E. B. Ground Edge, Central Fire, 1-10's..70¢ } 25&5 %
Double Waterproof, 1-10's..$1.40
Musket Waterproof, 1-10's..50¢
G. D..28¢
S. B..30¢
Union Metallic Cartridge Co.
F. C. Trimmed..50¢
F. L. Ground..65¢ } dis 25@
Cen. Fire Ground..70¢ } 25&5 %
Double Waterproof..$1.40
Double Waterproof, in 1-10's..$1.40
S. B. Genuine Imported..45¢
Eley's E. B..56¢
Eley's D Waterproof, Central Fire..$1.60
Cartridges—
Rim Fire Cartridges..dis 60&2 %
Rim Fire Military Cartridges..dis 15&2 %
Cen. Fire Cartridges, Pistol and Rifle..dis 40&2 %
Cen. Fire Cartridges, Military & Sporting..dis 30&2 %
Blank Cartridges, except 22 and 32 cal., an additional 10 % over above discounts.
Blank Cartridges, 22 cal..$1.50, dis 2 %
Blank Cartridges, 32 cal..$3, dis 2 %
Primed Shells and Bullets..dis 25&2 %
B. B. Caps, Round Ball..$1.60, dis 2 %
B. B. Caps, Conical Ball, Swaged..$1.75, dis 2 %
Primers—
Berdan Primers, all sizes, and B. L. Caps (for Sturtevant shells)..90¢, dis 2 %
All other Primers, all sizes..$1.10, dis 2 %
Shell —
Paper Shot Shells, 1st & 2d or S. G. qual..dis 25&5&2 %
Selfold's Combination Shot Shells..dis 25&10&2 %
Paper Shot Shells, Club, Rival, Climax..dis 40&5&2 %
Paper Shot Shells, Star Brand..dis 50&5&2 %
Brass Shot Shells, 1st quality..dis 60&2 %
Brass Shot Shells, Club, Rival & Climax..dis 65&2 %
Wads—
U. M. C. & W. R. A.—B. E., 11 up..$2.00
U. M. C. & W. R. A.—B. E., 9&10..2.30
U. M. C. & W. R. A.—B. E., 7&8..2.60 } dl 20&2 %
U. M. C. & W. R. A.—P. E., 11 up..3.10
U. M. C. & W. R. A.—P. E., 9&10..4.00
U. M. C. & W. R. A.—P. E., 7&8..4.90
Eley's B. E., 11 up..$1.75
Eley's P. E., 11 @ 20..$2.80

Anvils.
Eagle Anvils..₩ ℔ 10¢—dis 20 %
Wright's..9¾ @ 10¢
Armitage's Mouse Hole..9¢
Armitage Mouse Hole, Extra..11½¢
Trenton..9¼¢
Wilkinson's..9¼¢@10¢
J. & Riley Carr, Patent Solid..11@11½¢
Anvil Vise and Drill—
Millers Falls Co., $18.00..dis 20 %
Cheney Anvil and Vise..dis 25 %
Allen Combined Anvil and Vise, $2.50..dis 40 %
Richardson's Vise and Anvil..dis 25 %

Apple Parers.
Advance..₩ doz $4.50
Champion..₩ doz $7.50
Empire State..each $9.00
Eureka..each $12.00
Family Bay State..₩ doz $12.00
Gem..₩ doz $5.00
Improved Bay State..₩ doz $28.00
Improved Penn, 1884..₩ doz $5.50
Jersey..₩ doz $5.00
Little Star..₩ doz $5.00
Model..₩ doz $4.25
New Lightning..₩ doz $6.50
Rocking Table..₩ doz $6.50
Triumph, 1883..₩ doz $6.00
Turntable..₩ doz $5.00
Two-Knife..₩ doz $6.50
Waverly..₩ doz $4.50
White Mountain..₩ doz $4.75
Whittemore's Perfection..₩ doz $6.00
Whittemore's Simplicity..₩ doz $6.00
"72"..₩ doz $4.25
"76"..₩ doz $5.50
"78"..₩ doz $6.50

Augers and Bits.
Douglass Mfg. Co..dis 70 %
Other First Quality..dis 60&10&5 @ 70 %
Snell's..dis 60@60&10 %
Cook's, Douglass Mfg. Co..dis 55 %
Cook's, New Haven Copper Co..dis 50&10@50&10&5 %
Ives' Circular Lip..dis 60 %
Patent Solid Head..dis 30 %
C. E. Jennings & Co., No. 5..dis 40&10 %
C. E. Jennings & Co., No. 30..dis 60&10 %
C. E. Jennings & Co., Auger Bits, in fancy boxes, ₩ set, 32½ quarters, No 5, $5; No. 30, $3..dis 20 %
Lewis' Patent Single Twist..dis 45 %
Russell Jennings' Augers and Bits..dis 25 %
Imitation Jennings Bits (new list)..dis 50&10@50&10&5%
Car Bits, Snell Mfg. Co..dis 40&10&10 %
Car Bits, New Haven Copper Co..dis 50&10 %
L'Hommedieu Car Bits..dis 15 @ 20 %
Snell Mfg. Co.'s Jennings' Bits (new list)..dis 50&5 %
Expansive Bits—
Clark's small, $18; large, $26..dis 35@40 %
Ives' No. 4, per doz., $60..dis 35@35&5 %
Swan's..dis 40 %
Ansonia..dis 25 %
Steer's, No. 1, $26; No. 2, $22..dis 35 %
Hollow Augers—
Ives' } dis 25&10 %
French, Swift & Co. } dis 25&10 %
Douglass'..dis 25 %
Bonney's Adjustable ₩ doz. $48..dis 40&10 %
Stearns' Adjustable ₩ doz. $48..dis 20&10 %
Ives' Expansive, each $4.50..dis 45 @ 50 %
Universal Expansive, each $4.50..dis 20 %
Wood's..dis 25 %
Gimlet Bits—
Common..₩ gross $3.00 @ $3.25
Diamond..₩ doz. $1.10, dis 25&10 %
"Bee'..dis 25 %
Double Cut, Shepardson's..dis 45 %
Double Cut, Ct. Valley Mfg. Co..dis 30&10 %
Double Cut, Hartwell's, ₩ gro, $6.50..dis 10 %
Double Cut, Douglass'..dis 40 %
Double Cut, Ives'..dis 50&10 %
Drill Bits—
Syracuse Twist..dis 30 @ 30&5 %
Holt's Bit Stock Drills..dis 25&10 %
Ship Augers and Bits—
L'Hommedieu's..dis 15 @ 20 %
Watrous's..dis 15 @ 20 %
Snell's..dis 15 @ 20 %
Snell's Ship Auger Pattern Car Bits..dis 15 @ 20 %

Awl Hafts.
Sewing, Brass Ferrule..$3.50 ₩ gross—dis 40&10 %
Patent Sewing, Short..$1.00 ₩ doz—dis 40&10 %
Patent Sewing, Long..$1.20 ₩ doz.—net
Patent Peg, Plain Top..$10.00 ₩ gross—dis 40&10&5 %
Patent Peg, Leather Top..$12.00 ₩ gross—dis 40&10&5 %

Awls, Brad Sets, &c.
Awls, Sewing, Common..₩ gross $1.70—dis 35 %
Awls, Shouldered Peg..₩ gross $2.45—dis 40 %
Awls, Patent Peg..₩ gross 63¢—dis 40 %
Awls, Shouldered Brad..$2.70 ₩ gross—dis 35 %
Awls, Handled Brad..$7.50 ₩ gross—dis 45 %
Awls, Handled Scratch..$7.50 ₩ gross—dis 35&5 %
Awls, socket Scratch..$1.50 ₩ doz—dis 25 @ 50 %

Awls and Tools.
Aiken's Sets, Awls & Tools..₩ doz. $10.00—dis 50&10 %
Adj. Tool Handles, No. 1..₩ doz $12—dis 25 @ 25&10 %
Adj. Tool Handles, No. 2..₩ doz $18—dis 25 @ 25&10 %
Brad Sets, No. 42, $10.50; No. 43, $12.50..dis 70&10&5 %
Brad Sets, Stanley's Excelsior, No. 1, $7.50. } dis 25&10 %
Brad Sets, Stanley's Excelsior, No. 2, $4.00. }
Brad Sets, Stanley's Excelsior, No. 3, $5.50. }

Axes.
Best according to brand..₩ doz $6.25 @ $7
Good Seconds..$5.50 @ $6

Axle Grease.
Frazer's, in bulk..Keg ₩ ℔, 5¢; Pail, ₩ ℔, 6¢ net
Frazer's, in boxes..₩ gross $9.50 @ $10

Axles.
Nos. 1 to 6..dis 60 %
Nos. 7 to 18..dis 60&10 %
Nos. 19 to 22..dis 70&10 %
Nos. 23 to 26..dis 50&10 %
Tubular Wrought Steel (National Self-Oiling):
Less than 10 sets..dis 33⅓ %
Over 10 sets..dis 33⅓&5 %

Bag Holders.
Sprengle's Pat., ₩ doz $18..dis 60 %

Balances.
Spring Balances..dis 40&10 @ 50 %
Common 24 ℔..₩ doz., $1.50—dis 40&10 @ 50 %

Bells.
Hand—
Light Brass..dis 75&10 @ 80&5 %
Extra Heavy..dis 65&10 @ 70 %
White Metal..dis 70 @ 70&5 %
Silver Chime..dis 25&10&5 %
Globe (Cone's Patent)..dis 25&10 %
Door—
Gong, Abbe's..dis 25&10 %
Gong, Yankee..dis 40&10 %
Gong, Barton's..dis 40&10 %
Crank, Taylor's..dis 25&10 %
Crank, Brooks'..dis 50&10&2 %
Crank, Cone's..dis 10 %
Crank Connel's..dis 20&10 %
Lever, Sargent's..dis 60&10&10 %
Lever, Taylor's Bronzed or Plated..net
Lever, Taylor's Japanned..dis 25&10 %
Lever, R. E. M. Co.'s..dis 50&10&2 %
Pull, Brook's..dis 50&10&2 %
Pull, Western..dis 25&10 %
Gong, etc—
Common Wrought..dis 60&10 @ 60&10&5 %
Western..dis 20&10 %
Western, Sargent's list..dis 70&10 %
Kentucky "Star"..dis 20&10 %
Kentucky, Sargent's list..dis 70&10 %
Dodge, Genuine Kentucky, new list..dis 70 %
Nos. 0 1 1½ 2 3 4 5 6 7 Hog
$12.00 10.00 9.00 8.00 6.00 5.00 4.00 3.00 2.50 5.00
Texas Star..dis 50&10 @ 50&10&5 %
Call..dis 40@40&5 %
Farm Bells..₩ ℔, 3 @ 3½¢
Steel Alloy Church and School Bells..dis 40 %

Bellows.
Blacksmiths'..dis 50&10@50&10&5 %
Molders'..dis 50@50&5 %
Hand Bellows..dis 50@50&5 %

Belting, Rubber.
Standard..dis 70&5 %
Extra..dis 60@60&10 %
N. Y. B. & P. Co., Standard..dis 60 % } dis 5 % cash.
N. Y. B. & P. Co., Ex. Standard..dis 50&10 %
Cleveland Rubber Co., Extra Standard..dis 60&10 %

Bench Stops.
Hotchkiss's..₩ doz $5.00—dis 10 %
Weston's, per dos No. 1, $10: No. 2, $9..dis 25&10&5 %
McGill's..₩ doz $3—dis 10 %
Morrill's..₩ doz $7.50—dis 40&5@50 %

Bit Holders.
Extension, Barber's..₩ doz $15.00—dis 40&5 %
Extension, Ives'..₩ doz $20.00—dis 40&10 @ 40&10&5 %
Diagonal..₩ doz $24.00—dis 40 %
Angular..₩ doz $24.00—dis 40&5 %

Blind Adjusters.
Domestic..₩ per doz $3.00—dis 30 %
Excelsior..₩ doz $10.00—dis 50&10&2 %

Blind Fasteners.
Hackrell's..₩ doz pairs, $1.00—dis 20&10 %
Van Sand's Screw Pattern..$15 ₩ gro.—dis 50&10 %
Van Sand's Old Pattern..$15 ₩ gro.—dis 50&10 %
Washburn's Old Pattern..$9 ₩ gro. net
Merriman s..new list, net
Salisbury & Austin No. 2008..$9 ₩ gro. net
Security Gravity..$9 ₩ gro. net

Blind Staples.
Barbed, ½ in. and larger..₩ ℔ 8 @ 8½¢ net
Barbed, ⅝ in..₩ ℔ 9 @ 9½¢ net

Blocks.
Tackle Blocks, &c. list April 17, 1885..dis 20 %
Reed Mfg. Co. Self-Lubricating..dis 50 %

Bolts.
Door and Shutter—
Cast Iron Barrel, Square, &c..dis 70 @ 70&5 %
Cast Iron Shutter Bolts..dis 70 @ 70&5 %
Cast Iron Chain (Sargent's list)..dis 70 @ 70&5 %
Ives' Patent Door Bolts..dis 55&10 %
Wrought Barrel..dis 70 @ 70&5 %
Wrought Square..dis 70 @ 70&5 %
Wr't Shutter, all Iron, Stanley's list..dis 60&10 %
Wr't Shutter, Brass Knob, Stanley's..dis 40&10 %
Wrought Shutter, Sargent's list..dis 60&10&5 %
Wrought Sunk Flush, Sargent's list..dis 60&10&5 %
Wrought Sunk Flush, Stanley's list..dis 40&10&5 %
Wrought B. K. Flush, Com'n Stanley's list..dis 55&10 %
Carriage—
Com. list June 10, '84..dis 80 @ 80&5 %
Genuine Eagle, list Oct., '84..dis 75&5@75&10%
Phila. pattern, list Oct. 7, '84..dis 75&10@80 %
R. B. & W., old list..dis 70&5 %
Stove—
Common, list Feb. 28, 1883..dis 70 %
Am. S. Co., Norway, Ph'l., list Oct. 16, '84..dis 82½ %
Am. S. Co., Eagle, Phil., list Oct. 16, '84..dis 82½&5 %
Am. S. Co., Bay State, list Feb. 28, '83..dis 70 %
R. B. & W., Philadel. list Oct. 16, 1884..dis 80&5 %
Stove and Plow—
Stove..dis 70 @ 70&5 %
Plow..dis 65 %
R. B. & W., Plow..dis 50&5 %
R. B. & W., Stove..dis 70&5 %
Machine..dis 80 %
Bolt Ends..dis 80 %

Borax.
..₩ ℔ 8½¢ @ 9¢

Boring Machines.

Without Augers.	Upright.	Angular.
Douglas	$5.50	$6.75..dis 50 %
Snell's, Rice's Patent	5.50	6.75..dis 40&10&10 %
Jennings	5.50	6.75..dis 45@45&10%
Other Machines	2.50	3.00..net
Phillips' Pat., with Augers	7.00	7.50..net

Bow Pins
Humason, Beckley & Co.'s, Nos 1 and 2—
..dis 60&10 @ 60&10&5 %
Humason, Beckley & Co.'s other Nos..dis 70 @ 70&10 %
Sargent & Co.'s..$17 and $18, dis 60&10 %
Peck, Stow & W. Co..dis 50&10 @ 50&10&5 %

Braces.
Q. S. Backus..dis 50&10 @ 50&10&10 %
Barber's, Nos. 10 to 16..dis 50 %
Barber's, Nos. 30 to 33..dis 50 %
Barber's, Nos. 40 to 63..dis 50&10 %
Spofford's..dis 50&10 @ 50&10&10 %
Ives' Patent Braces..dis 60@60&10 %
Common Ball, American..dis 55&10 %
Bartholomew's, Nos. 25, 27, 30..dis 50&10@50&10&10%
Bartholomew's, Nos. 117, 118, 119..dis 60 %
Amidon's Barker's Imp'd..dis 60@60&10&5 %
Amidon's Corner Brace..dis 40 @ 40&10 %
Universal..3 in., $1.90; 10 in., $2.10
Buffalo Ball..8 in., $1.50 @ $1.55

Brackets.
Shelf, plain, Sargent's list..dis 60&10 %
Shelf, fancy, Sargent's list..dis 60&10&10 %
Reading, plain..dis 60&10&5 %
Reading, Rosette..dis 60½&10 %

Bright Wire Goods.
Regular list..dis 70&10&5 @ 70&10&10&5 %

Broilers.

Henis' Self-Basting.. { Inch	9	10	9 x 11
{ Per doz	$4.50	5.50	6.50

Buckets.—See Well Buckets and Pails.

Bull Rings.
Union Nut Co..dis 55 %
Sargent's..dis 60½&10 %
Hotchkiss' low list..dis 30 %
Humason, Beckley & Co.'s..dis 70&10 %
Peck, Stow & W. Co.'s..dis 50&10 %
Ellrich Hdw. Co., White Metal, low list..dis 50 %

Butts.
Brass—
Wrought Brass..Association price, dis 70 %
Cast Brass, Tiebout's..dis 40 %
Cast Brass, Corbin's F. Joint..dis 33⅓&10@33⅓&10&10 %
Cast Brass, Loose Joint..dis 33⅓&10@33⅓&10&10 %
Cast Iron—
Fast Joint, Narrow..dis 60&10@60&10&10 %
Fast Joint, Broad..dis 60&10@60&10&10 %
Loose Joint, Japanned..
Loose Joint, Jap. with Acorns..
Parliament Butts..
Mayer's Hinges..
Loose Pin, Acorns..
Loose Pin, Acorns, Japanned..
Loose Pin, Acorns, Jap, Pltd. Tips..
} dis 70&10&10 @ 70&10&10& 10 %
Wrought Iron—
Fast Joint, Narrow..dis 60&10&10 %
Fast Joint, Lt. Narrow..dis 60&10&10 %
Fast Joint, Broad..dis 60&10&10 %
Loose Joint, Broad..dis 60&10&10&5 %
Table Butts, Back Flaps, &c..dis 60&10&10 %
Inside Blind, Regular..dis 60&10&10 %
Inside Blind, Light..dis 60&10&10 %
Loose Pin, Wrt..dis 60&10&10&5 %
Loose Pin, Light..dis 60&10&10 %
Bronzed Wrought Butts..dis 45&5@45&10 %
Blind Butts—
Parker..dis 75&2 %
Palmer..dis 50&5&10 %
Seymour..dis 70&2 %
Lull & Porter..dis 80&10 %
Nicholson..dis 45&10 %
Huffer..dis 50
Clark's, Nos. 1, 3, 5..dis 80 @ 80&5 %
Sargent's, Nos. 1, 3..dis 75&10 %
Sargent's, No. 12..dis 75&10&10 %
Reading's Gravity..dis 75&10 %
Shepard's "Noiseless," Nos. 50, 60, 65, 45 and 55..dis 75&10&5 @ 80 %
Shepard's Champion Gravity, No. 75..dis 80&10 %
Shepard's "Gravity," Nos. 1, 3 and 5..dis 80 @ 80&5 %
North's Automatic Blind Fixtures, No. 2, for Wood, $9; No. 3, for Brick, $10.50.
Shepard's "O. S." and "Acme" Lull & Porter..dis 75&10&5 %
Shepard's "Queen City" Reversible..dis 75&10&5 %
Clark's Improved Shutter Hinge, Nos. 0, 1, 1½, 2, 2½, 3..dis 70 %

Butcher's Cleavers.
Humason & Beckley Mfg. Co..dis 30&5 @ 30&10 %
Bradley's..dis 25 @ 30 %
Beatty's..dis 33⅓&5 %

1	2	3	4	5	6	7	8
$16.50	19.00	21.50	24.00	27.00	30.00	33.50	36.50

New Haven Edge Tool Co.'s..dis 40 %
Albertson Mfg. Co..dis 33⅓ @ 33⅓&5 %

Calipers.—See Compasses.

Can Openers.
Messenger's Comet..₩ doz $3.00, dis 25 %
American..₩ gross $3.00
Dupiex..₩ doz 25¢, dis 15 @ 20 %
Lyman's..₩ doz $3.75, dis 20 %
No. 4, French..₩ doz $2.25, dis 55 @ 60 %
No. 5, Iron handle..₩ gross $6.00, dis 45 @ 50 %
Eureka..₩ doz $2.50, dis 10 %
Sardine Scissors..₩ doz $7.00, dis 55 %
Star..₩ doz $5.00, dis 25&5 %
Sprague, No. 1, $2; No. 2, $2.25; No. 3, $2.50..dis 60@60&5 %
World's Best, ₩ gross, No. 1, $12.00; No. 2, $24.00; No. 3, $36.00..dis 50&10 %
Universal..₩ doz $3.00, dis 35&5 %
Domestic..₩ doz $2.50, dis 45 %
Champion..₩ doz $2.00, dis 50 %

Cards.
Horse and Curry..dis 10 @ 10&10 %
Cotton..New list, Aug., 1883, dis 10 %
Wool.." " " " dis 10 %

Carpet Stretchers.
Cast Steel, Polished..₩ doz $8.25
Cast Iron, Steel Points..₩ doz 80¢
Socket..₩ doz $1.75
Bullard's..dis 25 %

Carpet Sweepers.
Bissell No. 5..₩ doz $17.00
Bissell No. 7 New Drop Pan..₩ doz $19.00
Bissell No. 12 Hall Sweeper..₩ doz $42.00
Mystic..₩ doz $17.00
Cottage..₩ doz $15.00
Garland..₩ doz $19.00
Queen..₩ doz $16.00
Queen, with band..₩ doz $18.00
King..₩ doz $30.00

Cartridges.—See Ammunition.

Casters.
Bed..
Plate..
Shallow Socket..
Deep Socket..dis 45 @ 50 %
Yale Casters, reduced list May, 1884..dis 25@25&10 %
Martin's Patent (Phœnix)..dis 45&10 @ 50 %
Payson's Anti friction..dis 60 %
"Giant" Truck Casters..dis 10 @ 10&5 %
Stationary Truck Casters..dis 45&10

Cattle Leaders.
Humason, Beckley & Co.'s..dis 75 %
Sargent's..dis 60½&10 %
Hotchkiss..dis 30 %
Peck, Stow & W. Co..dis 50&10 %

Chain.
Trace, 6¼-10-2 Exact..₩ pair 70¢ }
Trace, 6¼-10-3 Exact..₩ pair 70¢ } dis 50&10 @ 60 %
Trace, 7-10-2 Exact..₩ pair 80¢ }
Log, Fifth, Stretcher, and other fancy Chains, list Nov. 1, 1884..dis 50&10 @ 60 %

American Coil....	5-16	¼	5-16	⅜	7-16	½
	$0.8	.06	.05¼	04¼	.04¼	.04¼

German Coil, list of June, 1881..dis 55&5 %
German Halter Chain, list of June, 1884..dis 55&5 %
Covert Halter, Hitching and Breast..dis 50&2 %
Covert Traces..dis 35&2 %
Meneely's Breast, Halter and Hitching..dis 50&10 %
Meneely's Pat. Sleeve-Snap Breast..dis 50&10
Oneida Halter Chain (old list)..dis 45 %
Galvanized Pump Chain..₩ ℔ 5½¢ @ 6¢
Jack Chain, Iron..dis 75 @ 75&10 %
Jack Chain, Brass..dis 70&10 @ 70&10&10 %

Chalk.
White..₩ gro 55¢
Red..₩ gro 75¢
Blue..₩ gro 90¢
White Crayons..₩ gro 12¢ @ 13¢

Chalk Lines.—See Lines.

Chisels.
Socket Framing and Firmer..dis 80 %
Douglass & Witherby..dis 75 @ 75&10 %
Socket Framing and Firmer, Buck Bros..dis 80 %
Socket Framing and Firmer, Merrill..dis 60&10&10 %
Socket Firmer, Framing, &c., L. & I. J. White..dis 25&5 %
Socket Framing Firmer &c., Crossman..dis 65&5 %
Tanged Firmers..dis 50 @ 50&5 %
Tanged Firmers, Butcher's..$4.75 @ $5.00
Tanged Firmers, Spear & Jackson's..$5.00 to £
Tanged Firmers, Buck Bros..dis 30 %

Clamps.
Providence Tool Co.'s Wrought Iron..dis 25 %
Adjustable, Gray's..dis 20 %
Adjustable, Lambert's..dis 20 %
Adjustable, Snow's..dis 40&5 %
Adjustable, Hammer's..dis 15 %
Adjustable, Stearns'..dis 20&10 %
Cabinet, Sargent's..dis 70&10 %
Carriage Makers', Sargent's..dis 70&10 %
Ebernard Mfg. Co..dis 40&5 @ 40&10 %
Warner's..dis 40&10 %
Saw Clamps..See Vises

Clips.
Axle and Spring Bar, Norway Iron..dis 65&2 %
Wrought-Iron Felloe Clips..₩ ℔ 5½¢
Steel Felloe Clips..₩ ℔ 5¢

Coal Hods.
Sidney Shepard & Co.'s list..dis 45 %
Iron Clad Mfg. Co.'s and } list..dis 70 %
Central Stamping Co.'s }
Whiting & Co., Japanned..dis 70 %
Whiting & Co., Galvanized..dis 70&5 %

Coal Vases.
Buffalo Palace, S. S. & Co..dis 33⅓&10&10 %
Buffalo Common, S. S. & Co..dis 33⅓&10&10 %

Cockeyes..dis 50 %

Cocks, Brass.
Racking..dis 65&5 %
Globe..dis 65&5 %
Plain Bibbs..dis 60&5 %
Ale and Beer..dis 60&5 %

Coffee Mills.
Board and Box..dis 40&10&2 @ 45&10&2 %
Selsor's Patent..$9.50, $10.50, dis 25 %
American, Enterprise Mfg. Co..dis 20&10&10 %
The "Swift," Lane Bros..dis 20&10 %
Webb's Patent..dis 45 %

Compasses, Dividers, &c.
Compasses..dis 60&10&10 %
Callipers..dis 60&10&10 %
Dividers..dis 60&10&10 %
Bemis & Call Co.'s Dividers..dis 60&5 %
Bemis & Call Co.'s Compasses & Calipers..dis 50&5 %
Bemis & Call Co.'s Wing & Inside or Outside..dis 50&5 %
Bemis & Call Co.'s Double..dis 60 %
Bemis & Call Co.'s (Call's Patent Inside)..dis 30 %
Excelsior..dis 50 %
Cook's Extension..dis 25 @ 25&10 %
J. Stevens & Co.'s Calipers and Dividers..dis 25&10 %

Coopers' Tools.
Bradley's..dis 20 %
Barton's..dis 20@20&5 %
L. & I. J. White..dis 20&5 %
Albertson Mfg. Co..dis 25 %
John Beatty & Co..dis 33⅓ %

Corkscrews.
Humason & Beckley Mfg. Co..dis 40 %
Clough's Patent..dis 33⅓ @ 33⅓&5 %
Howe Pros. & Hulbert..dis 35 %

Corn Knives and Cutters.
Bradley's..dis 10 %
Wadsworth's..dis 25 %

Cradles.
Grain..dis 40&5&2 %

Crow Bars.
Cast Steel..₩ ℔ 3½@3¾¢
Iron, Steel Points..₩ ℔ 3½@3¾¢

Curry Combs.
Fitch's..dis 50&10 @ 50&10&5 %
Rubber..₩ doz $10.00, dis 25 @ 30 %

Curtain Pins.
Silvered Glass..net
White Enamel..net

Cutlery.
Beaver Falls and Booth's..dis 33⅓ %
Goodell Co., Table..dis 35 @ 40 %
Wostenholme..$7.75 @ $8.00 to £

Dividers—See Compasses.

Dog Collars.
Embossed Gilt, Pope & Stevens' list..dis 30&10 %
Leather, Pope & Stevens' list..dis 40 %
Brass, Pope & Stevens' list..dis 40 %

Door Springs.
Torrey's Rod, regular size..₩ doz $1.45 @ $1.50
Gray's..₩ gro, $20.00, dis 20 %
Bee Rod..₩ gro, $20.00, dis 20 %
Warner's No. 1, ₩ doz, $2.50; No. 2, $3.30..dis 40&10 %
Gem (Coil)—List
No. 1, Large Japanned..₩ doz $4.00 }
No. 2, Medium, Japanned..₩ doz 2.75 } dis 50&10 %
No. 3, Small, Japanned..₩ doz 2.00 }
Star (Coil)—List
No. 4, ("Shoo Fly") Screen Door size..₩ doz $1.50
No. 5, Screen Door size..₩ doz 2.00
No. 6, Medium..₩ doz 2.75
No. 7, Large..₩ doz 4.00
Japanned and Coppered..dis 60 %
Galvanized and Nickel-Plated..dis 50 %
Victor (Coil)..dis 50&10&10 %
Champion (Coil)..dis 50&10 @ 50&10&10 %
Philadelphia..5 in., $5.00; 8 in., $7.75, dis 30 %
Powell's..No. 1, ₩ doz $18.00; No. 2, $15.00, dis 50 %
Ruhrl, complete..₩ doz $2.25, dis 30&10 %
Herculean..dis 50 %
Shaw Door Check and Spring..dis 25 @ 30 @ 35 %
Elliott's Door Check and Spring..dis 25 %

Drawing Knives.
Douglass & Witherby..dis 75 @ 75&10 %
Merrill..dis 60&10&10 %
Watrous..dis 15&10 %
L. & I. J. White..dis 20&5 %
Bradley's..dis 35 %
Adjustable Handle..dis 20 @ 25 %

Drills and Drill Stocks.
Blacksmiths'..each, $1.60 @ $1.70
Blacksmiths' Self-Feeding..each, $7.50, dis 20 %
Breast, P. S. & W..dis 40&10 %
Breast, Wilson's..dis 30&10 %
Breast, Millers Falls..each, $5.00 dis 25 %
Breast, Bartholomew's..each, $2.50, dis 25&10 @ 40 %
Ratchet, Merrill's..dis 20 %
Ratchet, Ingersoll's..dis 25 %
Ratchet, Parker's..dis 20 @ 20&5 %
Ratchet, Whitney's..dis 20&10 %
Ratchet, Weston's..dis 20@25 %
Ratchet, Moore's Triple Action..dis 25 @ 30 %
Whitney's Hand Drill, Plain, $11.00; Adjustable, $12.00..dis 20&10 %
Wilson's Drill Stocks..dis 10 %
Automatic Boring Tools..each, $1.75 @ $1.85

Drill Chucks.
Morse's Beach Patent..each, $8.00, dis 20 %
Morse's Adjustable..each, $7.00, dis 20 @ 20&5 %
Danbury..each, $8.00, dis 30 @ 30&5 %

Dripping Pans.
Per ℔..5¢ @ 5½¢

Egg Beaters.
Dover..₩ doz..$2.50
National..₩ doz $4.50, dis 33⅓ %
Family (T. & S. Mfg. Co.)..₩ gro, $17.00@$18.00
Standard..₩ gro, $12.00
Kingston..₩ gro, $9.00
Acme..₩ gro, $8.00
Triumph (T. & S. Mfg. Co.)..₩ gro, $10.50@$11.50
Advance No. 1..₩ gro $10.50
Advance, No. 2..₩ gro $10.00
Bryant's..₩ doz $2.00, dis 25 %
Ayres' Spiral..₩ gro $5

Emery.
Regular numbers..₩ ℔ 7¢
Flour and F. F..₩ ℔ 6½¢
For Emery Paper and Cloth, see Sand Paper.

Enameled and Tinned Ware.—See Hollow-Ware.

Escutcheon Pins.
Iron and Brass, list Nov. 11, 1885..dis 50&10 %

Escutcheons.
Door Lock..Same discounts as Door Locks
Brass Thread..dis 60 @ 60&10 %
Wood..dis 25 %

Faucets.
Fenn's..dis 40 %
Bohren's Patent Rubber Ball..dis 25 %
Fenn's Cork Stops..dis 33⅓ %
Star..dis 60 @ 60&5 %
Frary & Patent Petroleum..dis 33⅓&5 10 %
West's Patent Key..dis 50 %
Anchor Lock..dis 45 %
Metallic Key, Leather Lined..dis 55&10 @ 60&10 %
Cork Lined..dis 70 @ 70&10 %
J. Sommer's Best Block Tin Key..dis 40 %
J. Sommer's Cork Lined, 1st quality..dis 50 %
J. Sommer's Diamond Lock..dis 40 %
Self-Measuring, Enterprise..₩ doz $36.00—dis 20&10 %
Self-Measuring, Lane's..₩ doz $36.00—dis 25&10 %
Self-Measuring, Victor..₩ doz $36.00—dis 25&10 %

Felloe Plates..₩ ℔ 6½¢ net

Files.
Domestic—
Best brands, list Dec. 1, 1885..dis 60&5@60&10 %
Lower Grade, list Dec. 1, 1885..dis 70 @ —%
J. B. Smith Co. Screw Tang, special list..dis 60 %
New Am. File Co., Pat. Tapers, special list..dis 50 %
Imported—
J. & Riley Carr..List, April 1, 1883, dis 15 %
J. & Riley Carr Horse Rasps..dis 10 %
Moss & Gamble..List April 1, 1883, dis 15 %
Butcher..Butcher's list, dis 20 %
Stubs..Stubs list, dis 25 @ 30 %

Fluting Machines.
Knox, 4½-inch Rolls..$3.25 each } dis 35 %
Knox, 6-inch Rolls..$3.60 each }
Eagle, 3¼-inch Roll..$2.15, dis 35 %
Eagle, 5½-inch Roll..2.85, dis 35 %
Crown, 4½ in., $3.50; 6-in, $4.00; 8-in., $6.50 each, dis 35 %
Crown Jewel..6-in., $3.50 each, dis 35 %
American, 5-in., $3; 6-in., $3.40; 7-in., $4.50 each, dis 35 %
Domestic Fluter..$3.50 each, net
Geneva Hand Fluter, White Metal..₩ doz $12, dis 25 %
Crown Hand Fluter, Nos. 1, $15; 2, $12.50; 3, $10.00, ₩ doz..dis 30 %
Shepard Hand Fluter, No. 85..₩ doz $15.30, dis 40 %
Shepard Hand Fluter, No. 110..₩ doz $11, dis 40 %
Shepard Hand Fluter, No. 95..₩ doz $8, dis 40 %
Clark's Hand Fluter..₩ doz $15.00, dis 33⅓ %
Combined Fluter and Sad Iron..₩ doz $15.00, dis 30 %
Buffalo..₩ doz $10.00 dis 10 %

Fluting Scissors..dis 45 %

Forks.
Hay, Manure, &c., Asso. list..dis 60&10&5@60&10&10 %
Hay, Manure, &c., Phila. list..dis 60 @ 60&5 %
Plated, see Spoons.

Freezers.—See Ice-Cream Freezers.

Fruit and Jelly Presses.
Enterprise Mfg. Co..dis 20&10 @ 33⅓ %

Fry Pans.
Central Stamping Co.'s list..dis 33⅓&2 @ —%

No	0	1	2	3	4	5	6	7	8
₩ doz	$1.50	1.75	2.00	2.25	2.50	2.75	3.25	3.75	4.25

Sidney Shepard & Co..dis 40&2 %
"Acme"..dis 60 %
Iron Clad Mfg. Co.'s list..dis 70 %

No	0	1	2	3	4	5	6	7	8
₩ doz	$3.00	3.75	4.25	4.75	5.25	6.00	7.00	8.00	9.00

Gauges.
Marking..dis 60&10 %
Wire..dis 10&10 %
Wire, Wheeler, Madden & Co..dis 10 %

Gimlets.
Nail and Spike..dis 50&10&5 %
"Eureka" Gimlets..dis 40&10 %
"Diamond" Gimlets..dis 40&10 %
Double Cut, Shepardson's..dis 45 %
Double Cut, Ives'..dis 50 %
Double Cut, Douglass'..dis 40 %
"Bee"..₩ gross $12, dis 25 %

Glue Pots.
Tinned and Enameled..dis 40&5@40&10 %
Family, Howe's "Eureka"..dis 40 %
Family, L. F. & C.'s "Handy"..dis 45 %

Grindstone Fixtures.
Sargent's Patent..dis 70&10&10 %
Reading Hardware Co..dis 35&10 @ 35&10&10 %

Hack Saws.
Griffin's Griffin's Hack Saws, complete..dis 40&10 %
Griffin's Hack Saw, Blades only..dis 40&10 %
Star Hack Saws and Blades..dis 25 %

Halters.—Covert's Pat. ½ Jute..dis 50&10 %
Covert's Hemp Horse and Cattle Ties..dis 50&10 %
Covert's Jute Horse and Cattle Ties..dis 60 %
Meneely's Pat. Adjustable Hemp and Jute..dis 50&10 %
Meneely's Hemp and Jute Horse and Cattle Ties..dis 50&10 %

Hammers.
Maydole's..List Dec. 1, 1885, dis 25 %
Cheney's, new list, March, 1883..dis 20&10 %
Hartford Hammer Co.'s Nail Ham's..dis 25&5@25&10 %
Buffalo Hammer Co..dis 30 @ 35 %
C. Hammond & Son..dis 40&10 @ 40&10&5 %
Humason & Beckley..dis 25 %
Verree..dis 5 %
Magnetic Tack, Nos. 1, 2, 3, $1.25, 1.50 and 1.75..dis

Ladies.
Melting, Sargent's ..... dis 60&10 %
Melting, Reading ..... dis 40&10 %
Melting, Monroe's Patent ..... ₱ doz. $4.00, dis 40 %
Melting, P. S. & W. ..... dis 35 @ 35&10 %
Melting, Warner's ..... dis 30 %

Lanterns.
Tubular, Standard No. 0. ₱ doz. ..... $6.75 @ $7.00
Tubular, Standard No. 1, ₱ doz. ..... 8.25 @ 8.50
Tubular, Lift Wire, No. 0, ₱ doz. 8.50
Tubular, Lift Wire, No. 1, ₱ doz. 10.00
Guards for Tubulars, add ₱ doz. 2c
Police, Small, $6.00; Medium, $7.25; Large, $8.75
Porter's Tin R. R. ..... $10 dis 20 %
Owl ..... $9, dis 20@25 %

Lemon Squeezers.
Porcelain Lined ..... ₱ doz. $6.00, dis 35&5 %
Wood ..... ₱ doz. $3.00, dis 35 %
Eureka, Tinned ..... ₱ doz. $8.00, dis 10 %
Dunlap's Improved ..... ₱ doz. $3.75, dis 20 %
Sammis'. ..... No. 1, $5; 2, $9; 12, $18 ₱ doz. dis 25&10 %
Townsend's Patent ..... $6.00 ₱ doz., dis 33⅓ %
Jennings' "Star" ..... $3.00 ₱ doz. net
The "Boss" ..... ₱ doz. $4.00, dis 10&10 %
Dean's Nos. 1, ₱ doz. $15.00; 2, $8.00; 3, $5.50 ..... dis 55 %
Little Giant ..... dis 50 %
Acme ..... ₱ gross $55.00, dis 50

Lines.
Cotton and Linen Fish, Draper's ..... dis 50 %
Draper's Chalk ..... dis 60 %
Draper's Mason's Linen, 84 ft., No. 1, $1.20; No. 2, $1.75; No. 3, $2.25; No. 4, $2.75; No. 5, $3.25 .. dis 25 %
Cotton Chalk ..... dis 55 %
Silver Lake, Braided, Nos. 0, $6.00; No. 1, $6.50; No. 2, $7.00; No. 3, $7.50 ₱ gross ..... dis 25 %
Masons' Linen, No. 3½, $1.50; No. 4, $2; No. 4½, $2.50
Masons' Colored Cotton ..... dis 45
Wire Clothes, No. 18, $3.35 @ $3.60; No. 19, $2.75 @ $3; No. 20, $2.25 @ $2.50.

Locks, Padlocks, Cabinet Locks, &c.
Door Locks, Latches, &c.—
List, Dec. 18, 1885 ..... dis 50&2 %
Nimick & Brittan's Burglar-Proof Locks .. dis
Reading Hardware Co. (list Feb. 2, 1885) ..... dis 70 %
Perkins' Burglar Proof ..... dis 60&25 %
Plate ..... dis 33⅓&2 %
F. Many's "Extension Cylinder" ..... $10.50 ₱ doz net
Barnes Mfg. Co ..... dis 40 %
Yale Flat Key ..... dis 40 %
Dietz Flat Key ..... dis 30 %
L. & C. Round Key Latches ..... dis 40&10 %
L. & J. Flat Key Latches ..... dis 33⅓&10 %
Yale new list ..... dis 40 %
"Shepardson" or "U. S." ..... dis 35 %
"Felter" or "American" ..... dis 40&10 %

Cabinet—
Eagle, Gaylord, Parker, Corbin } Changes made in list price of some numbers March 10, 1884, and Jan. 1, 1885. dis 40&2 % cash.
A. E. Deitz ..... dis 30@40 %
Stoddard Lock Co ..... dis 30 %
A. E. Deitz, Flat Key Drawer ..... dis 30@40 %
"Champion" Night Latches ..... dis 40 %
Yale ..... dis 40 %
Barnes Mfg. Co ..... dis 40 %
Eagle and Corbin Trunk ..... dis 25&2 %
"Champion" Cabinet and Combination ..... dis 33⅓ %
Romer's ..... dis 25 %

Padlocks—
Russell & Erwin, Mallory, Wheeler & Co., Nimick & Brittan Mfg. Co., Wm. Wilcox & Co., Norwich Lock Co. } New list Dec. 23, 1884. Dis 66⅔&2@70@ —, but prices are very
Yale Lock Mfg. Co. s ..... dis 40 %
Eagle ..... dis 25&2 %
Eureka, Eagle Lock Co ..... dis 40&2 %
Romer's, Nos. 0 to 91 ..... dis 40 %
Romer's, Nos. 200 to 505 ..... dis 25 %
Romer's, Nos. 600 to 1000 ..... dis 35 %
A. E. Dietz ..... dis 33⅓ %
"Champion" Padlocks ..... dis 30 %
Hotchkiss ..... dis 45 %
"Star" ..... dis 40 %
"Horse Shoe." ₱ doz. ..... $9 ..... dis 40 %
Barnes Mfg. Co ..... dis 30 %
Nock's ..... dis 25 %
Brown's Patent ..... dis 90 %
Scandinavian ..... dis 60 %
Fraim's Pat. Scandinavian, new list (low) ..... dis 60 %

Lumber Tools.
Ring Peavies, "Blue Line" Finish ..... ₱ doz $20.00
Ring Peaves, Common Finish ..... ₱ doz $18.00
Steel Socket Peavies ..... ₱ doz $21.00
Mail, Iron Socket Peavies ..... ₱ doz $19.00
Cant Hooks, "Blue Line" Finish ..... ₱ doz $16.00
Cant Hooks, Common Finish ..... ₱ doz $14.00
Cant Hooks, Mail. Socket Clasp, "Blue Line" Finish ..... ₱ doz $16.00
Cant Hooks, Mail. Socket Clasp Common Finish ..... ₱ doz $14.50
Cant Hooks, Clip Clasp, "Blue Line" Fin. ₱ doz $14.00
Cant Hooks, Clip Clasp, Common Finish .. ₱ doz $12.00
Hand Spikes ..... ₱ doz 6 ft., $15.00; 8 ft., $20
Pike Poles, Pike & Hook, ₱ doz. ..... 12 ft. $11.50, 14 ft. 12.50, 16 ft. 14.50, 18 ft. 17.50, 20 ft. 21.50
Pike Poles, Pike only, ₱ doz 10.00, 11.00, 13.00, 16.00, 20.00
Pike Poles, not Ironed, ₱ doz. 6.00, 7.00, 9.00, 12.00, 16.00
Setting Poles, ₱ doz. 14.00, 15.00, 17.00
Swamp Hooks ..... ₱ doz $18.00
Landing Blocks ..... ₱ doz $22.50
Skidding Tongs ..... ₱ doz $51.00
Log Binders ..... ₱ doz $26.00
Bended Boot Calks, 1 to 5 M, dis 25 %; 5 to 10 M, dis 30 %
Square Steel Boot Calks ..... dis 40 %
Chain Rafting Dogs ..... ₱ 100 $12.50
Ring Rafting Dogs ..... ₱ 100, med., $10.00; large, $12.00
Timber Grapples ..... ₱ doz $30.00

Lustro.
Four-ounce bottles ..... ₱ doz, $1.75; ₱ gro. $17.00 net

Mallets.
Hickory ..... dis 10&10&5 %
Lignumvitæ ..... dis 10&10&5 %
Fenfield Block Co, Lignumvitæ and Hickory .. dis 30 %

Mattocks.
Regular list ..... dis 60&10@60&10&5 %

Meat Cutters.
Dixon's—Nos. ₱ doz. ..... 1 $14.00, 2 17.00, 3 19.00, 4 30.00—dis 45 @ 45&5 %
Woodruff's ..... Nos. ₱ doz. 100 $15.00, 150 18.00—dis 45@45&5 %
Champion ..... Nos. ₱ doz. 200 $22.00, 300 27.00, 400 40.00—45@45&5 %
Hales' ..... Nos. ₱ doz. 11 $27.00, 12 33.00, 13 45.00 } dis 60&10&10 @ 70 %
American ..... dis 35 %
Nos. 1, 2, 3, 4B
Each $5.00, 7.00, 10.00, 25.00, 50.00, 60.00
Enterprise ..... dis 30 %
Nos. 10, 12, 22, 32, 42
Each $3.00, 2.50, 4.00, 6.00, 10.00
Pennsylvania ..... dis 40&10 %
Nos. 1, 2, 3, 00
₱ doz. $24.00, 28.00, 36.00, 28.00
Miles' Challenge. Nos. ₱ doz. ..... 1 $22.00, 2, 3 40.00—dis 45@45&5 %
Kieser's No. 55 ..... $40 ₱ doz., dis 40 @ 40&5 %
Kieser's Gem ..... $25 ₱ doz., dis 40 @ 40&5 %
Kieser's Monarch ..... $45 ₱ doz., dis 40 @ 40&5 %
Kieser's Butcher ..... $40 each, dis 30 @ 20&5 %
Draw Cut. Nos. 5, 2, 6, 8, 10
Each ..... $50.00, 75.00, 80.00, 225.00, 400.00—dis 20 %
Beef Shavers (Enterprise Mfg. Co.) ..... dis 20&10 %
Chadborn's Smoked Beef Cutter ..... ₱ doz, $60.00

Mincing Knives.
Am. (2d quality), ₱ gro, 1 blade, $7; 2 blades, $12; 3 blades, $18 ..... Net
Lothrop's ..... dis 20&10 %
Smith's, ₱ doz., Single, $2.00; Double, $3 .... dis 40@45 %
Knapp & Cowles ..... dis 50&10@60 %

Molasses Gates.
Stebbins' Pat's ..... dis 75&5 @ 75&10 %
Stebbins' Genuine ..... dis 70&7½&10 %
Stebbins' Tinned Ends ..... dis 40&10 %
Chase's Hard Metal ..... dis 50&10 %
Bush's ..... dis 20 %
Lincoln's Pattern ..... dis 70&10 %
Weed's ..... dis 20&10 %
Boss Nos. 1, 2, 3, 4
₱ doz., dis 60&10&10 % $7.00, 8.00, 9.00, 10.00

Money Drawers.—₱ doz., $18.

Wire Carpet Nails ..... See Tacks

Nails. See Trade Report
Wire Nails, list Nov. 11, 1885 ..... dis 50&10 %

Nail Puller.
Curtiss Hammer ..... ₱ doz $9.00 net
Giant, No. 1 ..... ₱ doz $50.00, dis 10 %
Pelican ..... ₱ doz $9.00, dis 25 %

Nuts and Washers.
Square Nuts ..... 9½¢ off list
Hexagon ..... 10½¢ off list
Washers ..... 9½¢ @ 10¢ off list
n lots less than 100 ₱, ₱ ₱ add ½¢ to list 1 ₱ boxes. 1¢ to list.

Nut Crackers.
Table (Humason & Beckley Mfg. Co.) ..... dis 40 %
Blake's Pattern ..... ₱ doz $2.00, dis 10 %
Turner & Seymour Mfg. Co ..... dis 50 %

Oakum.
Government ..... ₱ ₱ 7¼@7½¢
U. S. Navy ..... ₱ ₱ 6¾@7 ¢
Navy ..... ₱ ₱ 5¾@6 ¢

Oilers.
Zinc and Tin ..... dis 65@65&10 %
Brass and Copper ..... dis 50&10 %
Malleable (Hammer's), No 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₱ doz ..... dis 10 @ 10&10 %
Prior's Patent or "Paragon" Zinc dis 60&5 @ 60&10 %
Prior's Patent or "Paragon" Brass ..... dis 50 %
Olmstead's Tin and Zinc ..... dis 60 %
Olmstead's Brass and Copper ..... dis 50 %
Broughton's Zinc ..... dis 60 %
Broughton's Brass ..... dis 50 %

Packing, Steam.
N. Y. Belting & Packing Co. ..... dis 50 @ 50&10 %
American Packing ..... 11¢
Russia Packing ..... 14¢
Italian Packing ..... 15 @ 16¢
Cotton Packing ..... 15 @ 18¢

Padlocks.—See Locks.

Pails, Galvanized Water.

Quarts	10	12	14
Hill's Light Weight, ₱ doz.	$2.75	3.00	3.25
Hill's Heavy Weight, ₱ doz.	3.00	3.25	3.75
Whiting's	2.75	3.00	3.25
Fire Buckets	2.75	3.25	3.50

Buckets, see Well Buckets.

Pencils.
Faber's Carpenters' ..... high list, dis 50 %
Faber's Round Glit ..... ₱ gro $5.25 net
Dixon's Lead ..... ₱ gro $4.50 net
Dixon's Lumber ..... ₱ gro $6.75 net
Dixon's Carpenters' ..... dis 40&10 %

Picks.
Railroad, 5 to 6, $11.00; 6 to 7, $12. dis 60&10@60&10&5 %
Adze Eye, 5 to 6, $12.00; 6 to 7, $13. dis 60&10@60&10&5 %

Picture Nails.
Brass Head, Sargent's list ..... dis 50&10&10&10 %
Brass Head, Combination list ..... dis 50&10 %
Porcelain Head, Sargent's list ..... dis 50&10&10 %
Porcelain Head, Combination list ..... dis 40&10 %
Niles' Patent ..... dis 40 %

Pinking Irons ..... ₱ doz 65¢ net

Pipe, Wrought Iron.
1¼ and under, Plain ..... dis 42½ %
1¼ and under, Galvanized ..... dis 32½ %
1½ and over, Plain ..... dis 60 %
1½ and over, Galvanized ..... dis 42½ %

Planes and Plane Irons.
Wood Planes—
Moulding ..... dis 15&2 %
Bench, First Quality ..... dis 20&2 %
Bench, Second Quality ..... dis 25&2 %
} Small extras sometimes given by jobbers
Iron Planes—
Bailey's Stanley R. & L. Co.) ..... dis 20&10%
The Stanley (S. R. & L. Co.) ..... dis 20&10 %
Bailey's "Victor" ..... dis 20&10 %
Steer's Iron Planes ..... dis 35 %
Meriden Mal. Iron Co.'s Iron Planes ..... dis 20&10 %
Davis's Iron Planes ..... dis 20&10 %
Plane Irons—
Plane Irons ..... dis 20&10 %
Plane Irons, Butcher's ..... $5.00 @ $5.25 to £
Plane Irons, Buck Bros ..... $5.00 to £
Plane Irons, Middlesex Mfg. Co., "Baldwin Iron" ..... dis 33⅓ %
L. & I. J. White ..... dis 25 %

Pliers and Nippers.
Button's Patent ..... dis 30&10 @ 40 %
Hall's Pat. Compound Lever Cutting Nippers, No. 2, 5 in., $13.50; No. 4, 7 in., $21.00 ₱ doz. ..... dis 20&10 %
Humason & Beckley Mfg. Co ..... dis 50 %
Gas Pliers ..... dis 60 %
Eureka Pliers and Nippers ..... dis 40 %
Russell's Parallel ..... dis 25 %
P. S. & W. Cast Steel ..... dis 50 %
P. S. & W. Tinners' Cutting Nippers .... add 6 % dis 10 %

Plumbs and Levels.
Standard List ..... dis 70&10@70&10&10 %
Disston's ..... dis 45&10 %
Pocket Levels ..... dis 70&10@70&10&10 %
Davis' Inclinometers ..... dis 10&10 %

Post Hole and Tree Augers and Diggers.
Samson Post Hole Digger ..... ₱ doz $36.00, dis 20&10 %
Fletcher Post Hole Augers ..... ₱ doz $36.00, dis 20 %
Eureka Diggers ..... ₱ doz $18 @ $20
Leed's ..... ₱ doz $9.00 @ $9.50
Vaughan's Hollow Tube Post Hole ..... per doz, $24.00 ..... dis 33⅓ @ 20&10&10 %
Kohler's Little Giant ..... ₱ doz $24
Kohler's Hercules ..... ₱ doz $18.00
Kohler's New Champion ..... ₱ doz $10.00
Schneidler ..... ₱ doz $24, dis 2 % cash
Ryan's Post Hole Diggers ..... ₱ doz $24
Cronk's Post Bars ..... ₱ doz $60, dis 50&5 @ 50&10 %

Potato Parers.
White Mountain ..... ₱ doz $5.50
Antrim Combination ..... ₱ doz $8.00
Hoosier ..... ₱ doz $13.50

Pruning Hooks and Shears.
Disston's Combined Pruning Hook and Saw, ₱ doz $18.00 ..... dis 20&10 %
Disston's Pruning Hook ..... ₱ doz $12.00, dis 20&10 %
E. S. Lee & Co.'s Pruning Tools ..... dis 40 %
Pruning Shears ..... ₱ doz $5.75 @ $4.00 net
Henry's Pruning Shears ..... ₱ doz $4.50 net
Wheeler, M. & Co.'s Combination ..... ₱ doz $12, dis 20 %
Dunlap's Saw and Chisel ..... ₱ doz $8.50, dis 30 %
J. Mallinson & Co., A. & B. Co. list ..... dis 33⅓ %

Pulleys.
Hot House, Awning, &c ..... dis 66⅔&10 %
Japanned Screw ..... dis 66⅔&10 %
Brass Screw ..... dis 70&10 %
Japanned Side ..... dis 66⅔&10 %
Japanned Clothes Line ..... dis 60&10 %
Hay Fork, Solid Eye, $4.00; Swivel, $4.50 } dis 50&10 @ 50&10&5 %
Hay Fork, "Anti-Friction," 5 in. Solid, $5.70 ..... dis 50 %
Hay Fork, "F" Common and Pat. Bushed ..... dis 20 %
Hay Fork, Tarbox Pat. Iron ..... dis 20 %
Shade Rack ..... dis 45 %
Tackle Blocks ..... See Blocks

Pumps.
Cistern, Best Makers ..... dis 50 %
Pitcher Spout, Best Makers ..... dis 60 %
Pitcher Spout, Cheaper Goods ..... dis 70 @ 70&5 %

Punches.
Saddlers' or Drive, good quality ..... ₱ doz 68¢ @ 73¢
Bemis & Call Co.'s Cast Steel Drive ..... dis 50&5 %
Bemis & Call Co.'s Springfield Socket ..... dis 50&5 %
Spring, good quality ..... ₱ doz $2.50 @ $2.60
Spring, Leach's Patent ..... dis 15 %
Bemis & Call Co.'s Spring and Check ..... dis 40 %
Solid Tinners' ..... ₱ doz $1.44, dis 55 %
Tinners' Hollow Punches ..... dis 20&2 %

Rail.
Sliding Door, Wrought Brass ₱ ₱ 35¢, dis 20@25 %
Sliding Door, Bronzed Wrt. Iron ..... ₱ foot 7¢
Sliding Door Iron, Painted .... ₱ foot 4¢, dis 20&10&5 %
Barn Door, Light .... Incn. ¼, ⅝, ¾
Per 100 feet ..... $2.50, 3.00, 4.40—dis 10 %
B. D. for N. E. Hangers—

	Small.	Med.	Large
Per 100 feet	$2.15	2.70	3.25 net

Terry's Wrought Iron, 5¢ ₱ foot ..... net
Victor Track Rail, 7¢ ₱ foot ..... dis 50&2 %

Rakes.
Cast Steel ..... dis 60&10 @ 60&10&10 %
Malleable ..... dis 60&10 @ 60&10&10 %

Razor
J. R. Torrey Razor Co ..... dis 20 %
Wostenholme & Butcher ..... $10 to £, dis 10 %

Razor Strops.
Genuine Emerson ..... dis 60 %
Imitation Emerson ..... ₱ doz $2.00, dis 20&10&10 %
Torrey's ..... dis 20 %
Badger's Belt and Combination ..... ₱ doz $2
Lamont Combination ..... ₱ doz $4

Rivets.
Black and Tinned Iron, Flat Head M Rivets (in packages and in bulk) } dis 50 %
Block and Carriage (in C packages) }
Iron Rivets (other than above) in bulk } dis 45 %
Black and Tinned Burrs }
Note.—Outside Rivets are sold at concessions from above prices.
Copper Rivets and Burrs ..... dis 60&5 @ 60&10 %
Nos. 7, 8, 9, 10, 11, 12, 13, 14, 15
₱ ₱ .49¢, 50¢, 52¢, 54¢, 56¢, 58¢, 60¢, 65¢, 70¢

Rivet Sets ..... dis 50&2 %

Rods.
Stair, Brass ..... dis 25&5 %
Stair, Black Walnut ..... ₱ doz 50¢

Rollers.
Barn Door, Sargent's list ..... dis 60&10&10 %
Acme (Anti-Friction) ..... dis 55 %
Union Barn Door Roller ..... dis 70 %

Rope.
Mnf'rs list, November 11, 1885.

Manila	½ inch and larger	₱ ₱ 13 ¢
Manila	⅝ inch	₱ ₱ 13½¢
Manila	¼ and 5-16 inch	₱ ₱ 14 ¢
Manila Tarred Rope		₱ ₱ 12½¢
Manila, Hay Rope		₱ ₱ 13 ¢
Sisal	½ inch and larger	₱ ₱ 9 ¢
Sisal	⅜ inch	₱ ₱ 9½¢
Sisal	¼ and 5-16 inch	₱ ₱ 10 ¢
Sisal, Hay Rope		₱ ₱ 8 ¢
Sisal, Tarred Rope		₱ ₱ 8½¢
Sisal, Single Ply Lath Yarn		₱ ₱ 8 ¢

Dis 1¢ ₱ ₱.
Cotton Rope ..... ₱ ₱ 15 @ 18¢ net
Jute Rope ..... ₱ ₱ 7¢

Rules.
Boxwood ..... dis 80&5 @ 80&10 %
Ivory ..... dis 55 @ 55&10 %
Stephens' Ivory ..... dis 50 %

Sad Irons.
From 4 to 10, at factory ..... ₱ 100 ₱ $2.25 @ $2.50
Self Heat'ng ..... ₱ doz. $9.00 net
Self-Heating, Tailors' ..... ₱ doz. $18.00 net
Gleason's Shield and Toilet ..... dis 25 %
Mrs. Pott's Irons, Double Pointed ..... dis 35 @ 40 %
Mrs. Pott's Irons, Square Back ..... dis 35 @ 40 %
Enterprise Star Irons, new list, July 20, 1882 .... dis 35 %
Combined Fluter and Sad Iron ... ₱ doz. $15.00, dis 15 %
Fox Reversible, Self-Fluter ..... ₱ doz., $24.00 net
Chinese Laundry (N. E. Butt Co.) ..... 8½¢, dis 15 %
New England ..... 8¢, dis 15 %

Sand Paper and Emery Paper.
Baeder & Adamson's Flint, 00 to 1½ .. $4.50 ₱ ream
Baeder & Adamson's Flint, 2, 2½ & 3 .. 5.00 ₱ ream
Baeder & Adamson's Flint, assorted .. 4 75 ₱ ream
Baeder & Adamson's Star ..... 3.75 ₱ ream
Bloodgood's Flint, Nos. 00 to 1½ ..... ₱ ream $4.50
Bloodgood's Flint, assorted ..... ₱ ream 4.50
Bloodgood's Flint, Nos. 2 to 3 ..... ₱ ream 5.00
Bloodgood's Flint, No. 3½ ..... ₱ ream 5.50
Columbia Flint, all Nos ..... ₱ ream 4.00
Madison Mills Flint, all Nos ..... ₱ ream 3.50
Emery Paper, 00 to 1½, $6.50; 2, $7.50; 2½, $9.50
Emery Cloth, B. A. & Co., 00 to 1½, $18; 2, $20; 2½, $24 ..... dis 40 @ 45 %
Emery or Crocus Cloth, Sibley, 9x12 in., $16.00 } dis 20 %
Emery or Crocus Cloth, Sibley, 7x9 in., $10.50 }
New England, same list as B. & A. Flint ... dis 40 @ 45 %
Sand Paper without brand ..... ₱ ream, $1.75 @ $2

Sash Cord.
Common ..... ₱ ₱. 12½¢ @ 13¢ net
Patent ..... ₱ ₱. 15¢ @ 16¢ net
White Cotton Braided, fair quality ..... ₱ ₱ 30¢ @ 32¢
Common Russia Sash ..... ₱ ₱ 14¢
Patent " " ..... " 18¢
Cable Laid Italian " ..... " 28¢
India Cable Laid " ..... " 14¢
Silver Lake, A Quality, White ..... 50¢, dis 10&10 %
Silver Lake, A Quality, Drab ..... 55¢, dis 10&10 %
Silver Lake, B Quality, White .. 50¢, dis 10&10&10@30 %
Silver Lake, B Quality, Drab .. 55¢, dis 10&10&10@30 %
Silver Lake, C Quality, White (only) ..... 29¢ @ 30¢
Spring Lake, A Quality, 50@55¢, dis 10&10@10&10&10 %

Sash Locks.
Clark's No. 1, $10.00; No. 2, $8.00 ₱ gross ..... dis 33⅓ %
Ferguson's ..... dis 33⅓ %
Morris ..... dis 50&10 %
Morris' Triumph (revised list) ..... dis 60&10 %
Walker's ..... dis 10 %
Attwell Mfg. Co ..... dis 25 @ 33⅓ %
Hammond's Window Springs ..... dis 40 %
Common Sense, Japanned, Copperes and Bronzed ..... ₱ gross
Common Sense, Nickel Plated ..... ₱ gross $12.00 net
Universal ..... dis 30 %
Kempshall's Gravity ..... dis 60 %
Kempshall's Model ..... dis 60@60&10 %
Corbin's Daisy ..... dis 60&5@60&10 %
Payson's Perfect ..... dis 50&10&5 @ 60 %
Hugunin's New and Improved Adjustable Sash Balances, list March, 1885 ..... dis 33⅓ %
Hugunin's New Sash Locks, list March, 1885 .. dis 33⅓ %
Stoddard "Practical" ..... dis 10 %
Ives Patent ..... dis 55&10 %
Lieschе's Nos. 100 & 110, ₱ gro, $8; 105, $10. dis 20&10 %

Sash Weights.
Solid Eyes, in ton lots ..... ₱ ton, $20

Sausage Stuffers or Fillers.
Miles' "Challenge" ..... ₱ doz. $20, dis 45@45&5 %
Perry ..... ₱ doz. No. 1, $15; No. 0, $21, dis 45@45&5 %
Draw Cut, No. 4 ..... each, $30.00, dis 20 %
Enterprise Mfg. Co ..... dis 20&10 @ 30 %
Silver's ..... dis 25 %

Saws.
Disston's Circular, Mill and Cross Cut ..... dis 45&10 %
Disston's Hand, Panel, Rip, &c ..... dis 20&10 %
Atkins' Silver Steel Circular ..... dis 40 %
Atkins' Selected Steel Circular ..... dis 50 %
Atkins' Silver Steel Diamond X Cuts ..... ₱ foot 75¢
Atkins' Concave Tooth Dexter X Cuts ..... ₱ foot 55¢
Atkins' Special Steel Diamond X Cuts ..... ₱ foot 31¢
Atkins' Champion Tooth X Cuts ..... ₱ foot 32¢
Atkins' Hollow Back X Cuts ..... ₱ foot 22¢
Atkins' Band ..... dis 25 %
W. M. & C. Hand ..... dis 30 @ 30&5 %
W. M. & C. Champion X Cuts, Regular ..... ₱ foot 26¢
W. M. & C. X Cuts, Thin Back ..... ₱ foot 29¢
Peace Circular and Mill ..... dis 45&10 %
Peace Hand Panel and Rip ..... dis 20&10 @ 20&10&5 %
Peace Cross Cuts, Standard ..... ₱ foot 25¢
Peace Cross Cuts, Thin Back ..... ₱ foot 28¢
Peace Band Saws, all widths ..... dis 20&10 %
Richardson's Circular ..... dis 45 %
Richardson's Mill ..... dis 45 %
Richardson's X-Cuts, No. 1, 30¢; No. 2, 27¢; No. 3, 25¢
Richardson's Hand, Panel, Butcher, &c ..... dis 25&5 %
Boynton's Lightning X Cuts ..... ₱ ft 32¢
Boynton's Lightning One Man X Cuts .. ₱ ft 38¢ @ 40¢
Boynton's Lightning Buck Saws ..... ₱ doz $0.00

Saws, Hack.—See Hack Saws.

Saw Frames.
White, Vermont ..... ₱ doz $1.50, dis 25&10 %
Red, Polished and Varnished ..... ₱ doz $1.50, dis 10 %
Saw Rods ..... $10 list dis 10&10 %

Saw Sets.
Stillman's Genuine .... ₱ doz $5.00 and $7.75, dis 40&5 %
Stillman's Imitation .. ₱ doz $3.25 and $5.25, dis 40&5 %
Common Lever ..... ₱ doz $2.00, dis 40&5 %
Leach's ..... No. 0, $8.00; No. 1, $15.00, dis 15 %
Nash's ..... dis 20&10 @ 20&10&5 %
Hammer, Hotchkiss ..... $5.50, dis 10 %
Hammer, Bemis & Call Co.'s new Patent ... dis 30&5 %
Bemis & Call Co.'s Lever and spring Hammer .. dis 30&5 %
Bemis & Call Co.'s Plate ..... dis 10 %
Bemis & Call Co.'s Cross Cut ..... dis 12½ %
Aiken's Genuine ..... $13.00, dis 50&10 %
Aiken's Imitation ..... $7.00, dis 55&5 %
Hart's Patent Lever ..... dis 20 %
Disston's, Star, $9. No. 15 Hammer, $5.50 ... dis 20&10 %
Atkins' Adjustable ..... per doz $6.00
Atkins' Criterion ..... per doz $7.00
Morrill's, No. 1, $15.00; Nos. 3 and 4, $24. dis 40&10&5@50 %
Croissant (Keller), No. 1, $15.00; No. 2, $24.00, dis 33⅓&10 %
Boynton's No. 1, $12 ₱ doz; No. 2, $10 ..... dis 25 %

Saw Tools.
Atkins' Patent ..... per doz sets $6.00

Scales.
Hatch, Counter, No. 171 ..... ₱ doz $42.00, dis 50&10 %
Hatch, Tea, No. 161 ..... ₱ doz $15.00, dis 50&10 %
Union Platform, Plain ..... $2.15 @ 2.20
Union Platform, Striped ..... $2.30 @ 2.40
Chatillon's Grocers ..... dis 40 %
Chatillon's Eureka ..... dis 25 %
Chatillon's Family Favorite ..... dis 30 %
Family Universal ₱ doz, 12 ₱, $30.00; 24 ₱, $36.00, net
Family, Turnbull's ..... dis 30@30&10 %

Scale Beams.
Scale Beams, List of Jan. 12, 1882 .. dis 60&5 @ 60&10 %
Scale Beams, Custer ..... dis 25 %

Scrapers.
Adjustable Box Scraper (S. R. & L. Co.) .. $0.50, dis 20&10 %
Box, 1 Handle ..... ₱ doz $4.00, dis 10 %
Box, 2 Handle ..... ₱ doz $6.00, dis 10 %
Defiance Box and Ship ..... dis 20&10 %
Foot ..... dis 50&10 %
Ship, Common ..... ₱ doz $3.50 net
Ship, Providence Tool Co ..... dis 10 %

Screen Corners.
Porter's Pat. Window and Door Frame ..... dis 33⅓ %
Screen Corner Irons, Warner's ..... dis 33⅓ %

Screw Drivers.
Douglas Mfg Co ..... dis 20&10&10 %
Disston's ..... dis 45&10 %
Disston's Patent Excelsior ..... dis 45&10 %
Buck Bros ..... dis 30 %
Stanley R. & L. Co.'s Varnished Handles .... dis 60&10 %
Stanley R. & L. Co.'s Black Handles ..... dis 50&10 %
Sargent & Co.'s Nos. 1 & 20 Forged Blade .. dis 70&10 %
Sargent & Co.'s Nos. 40 & 30, Cast steel .. dis 55&10&10 %
Sargent & Co.'s No. 60, Round Blade .... dis 60&10&10 %
Knapp & Cowles' No. 1 ..... dis 60&20 @ 70 %
Knapp & Cowles' No. 1 Extra ..... dis 60 @ 60&10 %
Knapp & Cowles No. 00 & 4 ..... dis 50&5 @ 50&10 %
Sets Interchangeable ..... ₱ doz $18.00, dis 25 %
Champion ..... dis 25 %
Clark's Patent ..... dis 20&10 %
Crawford's Adjustable ..... dis 30 %
Knapp & Cowles' Screw-Driver Bitts ..... ₱ doz 90¢
Eilrich's Socket and Ratchet ..... dis 25 %
Allard's Spiral, new list ..... dis 25 %

Screws.
Wood Screws—An extra 5 % or 10 % is frequently given beyond the following regular printed prices:
Am. Screw Co.'s list, Jan. 1, 1885:
Flat Head Iron ..... dis 80 %
Round Head Iron ..... dis 75&10 %
Note.—On above Screws an extra discount of 10 % ¾ inch and smaller is given.
Flat Head Brass ..... dis 75&10 %
Round Head Brass ..... dis 75 %
Russell & Erwin list April 1, 1885:
Flat Head Iron ..... dis 85 %
Round Head Iron ..... dis 83½ %
Flat Head Brass ..... dis 85 %
Round Head Brass ..... dis 83¼ %
Brass and Silver Capped Screws ..... dis 40 %
Machine—
Flat Head, Iron ..... dis 60 %
Round Head, Iron ..... dis 55 %
Bench and Hand—
Bench, Iron ..... dis 55&10 @ 55&10&10 %
Bench, Wood, Beech ..... ₱ doz $2.25
Bench, Wood, Hickory ..... dis 20&10 %
Hand, Wood ..... dis 25&10 @ 25&10&5 %
Lag or Coach ..... dis 75&10 @ 80 %
Coach, Patent Gimlet Point ..... dis 75 @ 75&5 %
Bed ..... dis 25&5 %
Hand Rail, Sargent's ..... dis 66⅔&10 %
Hand Rail, Humason, Beckley & Co.'s ..... dis 70 %
Hand Rail, Am. Screw Co ..... dis 70 %

Scroll Saws.
Lester, complete, $10.00 ..... dis 25 %
Rogers, complete, $4.00 ..... dis 25 %

Scythes.
Grain Scythes—
Clipper, Full Polished, Boxed & Sharp ... ₱ doz $8.90
German, Cast or Silver Steel, either Half Set or Waldron, in Straw ..... ₱ doz $8.35
Grass Scythes—
Silver Clipper, Boxed and Sharp ..... ₱ doz $7.00
German Steel, Half Set Waldron ..... ₱ doz $6.10
Cast Steel and German Steel, Full Set or Waldron, Sharp and Boxed ..... ₱ doz $6.70
Bush, Bramble and Weed ..... ₱ doz $6.70
Clover ..... ₱ doz $7.00
Imperfect Grass and Bush ..... ₱ doz $5.00
Imperfect Grain ..... ₱ doz $6.70
Lawn—same price as corresponding finish.
Scythe Snaths ..... dis 4&50&2 %

Shears.
American (Cast) Iron ..... dis 75&10 @ 75&10&5 %
Pruning ..... See Pruning Hooks and Shears
Barnard's Lamp Trimmers ..... ₱ doz $3.75
Tinners' ..... dis 20&2 %
Seymour's, List, Dec., 1881 ..... dis 60&10&5 %
Heinsch's, List, Dec., 1881 ..... dis 60&10 %
Heinsch's Tailor's Shears ..... dis 33⅓ %
First quality C. S. Trimmers ..... dis 60 %
Second quality C. S. Trimmers .. dis 80&10 @ 80&10&5 %
Acme Cast Shears ..... dis 10&10 %
Diamond Cast Shears ..... dis 10 %
Clipper ..... dis 10&10 %
Victor Cast Shears ..... dis 75&10 %
Howe Bros. & Hulbert, Solid Forged Steel .... dis 40 %

Sheaves.
Sliding Door—
M. W. & Co., list ..... dis 66⅔&10&2 @ 70&5 %
R. & E., list ..... dis 60&10&2 %
Corbin's list ..... dis 60&10&2 %
Patent Roller ..... dis 60&10&2 %
Patent Roller, Hatfield's ..... dis 70 %
Russell's Anti-Friction ..... dis 60&10&2 %
Moore's Anti-Friction ..... dis 60 %
Sliding Shutter—
R. & E. list ..... dis 60&10&2 %
Sargent's list ..... dis 66⅔&10 %
Reading list ..... dis 66⅔&10 %

Ship Tools.
L. & I. J. White ..... dis 20&5 %
Albertson Mfg. Co ..... dis 25 %

Shovels and Spades.
Ames' Shovels, Spades, &c., list Nov. 1, 1885 .... dis 20 %
Griffith's Black Iron ..... dis 50&10 %
Griffith's Steel ..... dis 60 @ 60&10 %
Griffith's Solid Cast Steel R. R. Goods ..... dis 20 %
Old Colony ..... dis 15 @ 15&10 %
Groom Shovel Co ..... dis 20 @ 20&5 %
Hussey, Binns & Co ..... dis 20 @ 20&5 %
Lehigh Mfg. Co ..... dis 50&10 %
Payne Pettebone & Son, list Jan. 2, 1882 ..... dis 50&5 @ 50&10 %
R. T. Pettebone, Pat. Shovels, new list ..... dis 50 %
R. T. Pettebone, Pat. Scoops, new list ..... dis 20 %
Remington's (Lowman's Patent) ..... dis 30 @ 30&10 %
Rowland's, Black Iron ..... dis 50&10 %
Rowland's Steel ..... dis 60&5 @ 60&10 %

Shovels and Tongs.
Iron and Brass Head ..... dis 60&10&5@60&10&10 %

Sieves.

	Iron.	Plated.
Buffalo Metallic, S. S. & Co., new list	dis 50&20 %	

WHOLESALE METAL PRICES, December 23, 1885.

METALS.

IRON.—DUTY: Bars, 8-10¢ to 1 1-10¢ ℔ lb; provided that no Bar Iron shall pay a less rate of duty than 35 %. Sheet, 1 1-0¢ to 1 5-10¢ ℔ lb. Band, Hoop and Scroll, 1¢ to 1 4-10¢ ℔ lb. Railroad Bars weighing more than 25 lb ℔ yard, 7-10¢ of 1¢ ℔ lb.

Standard American Pig Iron.

Foundry No. 1 X	℔ ton	$18.00	@ 18.50
Foundry No. 2 X	℔ ton	16.00	@ 16.50
Gray Forge	℔ ton	15.50	@ .....

No. 1 Scotch Pig Iron.

Carnbroe	℔ ton	.....	@ .....
Coltness	℔ ton	20.50	@ 21.00
Shotts	℔ ton	20.00	@ 20.50
Glengarnock	℔ ton	19.50	@ .....
Gartsherrie	℔ ton	20.00	@ 20.50
Langloan	℔ ton	20.50	@ 21.00
Summerlee	℔ ton	19.50	@ 20.00
Dalmellington	℔ ton	19.00	@ 19.50
Eglinton	℔ ton	18.00	@ 18.50
Clyde	℔ ton	18.50	@ 19.00

Rails.

Steel, at Eastern mills	℔ ton	$34.00	@ 34.50
Old Rails, Ts	℔ ton	$19.50	@ 20.00

Scrap.

Wrought, ℔ ton from yard		19.00	@ 20.00

Bar Iron from Store.

Common Iron:			
¾ to 1 in. round and square... / 1 to 6 in. x ⅜ to 1 in ..... \	℔ lb	1.6	@ 1.75¢
Refined Iron:			
¾ to 2 in. round and square... / 1 to 6 in. x ⅜ to 1 in ..... \	℔ lb	1.85	@ 2.3¢
1 to 6 in. x ⅛ and 5-16	℔ lb	1.9	@ 2.4¢
Rods—⅜ and 11-16 round and sq	℔ lb	1.7	@ 2.3¢
Bands—1 to 6x3-16 to No. 12	℔ lb	2	@ 2.5¢
"Burden's Best" Iron, base price	℔ lb		2.9¢
Burden's "H. B. & S." Iron, base price	℔ lb		2.5¢
Norway Nail Rods			5 @ 6¢

Sheet Iron from Store.

		Common American.	R. G. Cleaned.
Nos. 10 to 16	℔ lb	2.70 @ 3 ¢	3½¢
17 to 20	℔ lb	3 @	3½¢
21 to 24	℔ lb	3 @	3½¢
25 and 26	℔ lb	3.12½ @	3¾¢
27	℔ lb	3.25 @	3¾¢
28	℔ lb	3.37½ @ 3.50	¢ 4 ¢

		B. B.	2d qual.
Galvanized, 10 to 20	℔ lb	5 ¢	4½¢
Galvanized, 21 to 24	℔ lb	5½¢	5 ¢
Galvanized, 25 to 26	℔ lb	6 ¢	5½¢
Galvanized, 27	℔ lb	6½¢	6 ¢
Galvanized, 28	℔ lb	7 ¢	6½¢
American Russia	℔ lb	A, 10¢	B, 9¢
Russia	℔ lb	10 ¢ @	10¾¢
American Cold Rolled B. B	℔ lb	5 ¢ @	7 ¢

Iron Wire.—*(See Wire.)*

STEEL.—DUTY. Ingots, Bars, Sheets, &c., valued at 4¢ ℔ lb or less, 45 % ad. val.; valued above 4¢ and not above 7¢ ℔ lb, 2¢ ℔ lb; valued above 7¢ and not above 10¢ ℔ lb, 2¾¢ ℔ lb; valued above 10¢ ℔ lb, 3¼¢ ℔ lb. *Extras.*—Steel Bars, Rods, &c., cold hammered or polished, in any way in addition to ordinary hot rolling, 1¼¢ ℔ lb in addition to above; Steel Circular Saw Plates, 1¢ ℔ lb in addition to the above.

American Cast Steel.

For American Steel, see Pittsburgh quotations.

Chrome Steel.

Too, Steel, ordinary sizes, ⅝ to 3 inches, net		10 @ 14¢
Adamantine Shoes and Dies		8 @ ..¢
Magnet Steel		14 @ ..¢

English Steel.

Best Cast	℔ lb	15 ¢
Extra Cast	℔ lb	16½ @ 17 ¢
Circular Saw Plates	℔ lb	14 ¢
Round Machinery, Cast	℔ lb	10 ¢
Swaged, Cast	℔ lb	16 ¢
Best Double Shear	℔ lb	15 ¢
Blister, 1st quality	℔ lb	14 ¢
German Steel, Best	℔ lb	10 ¢
2d quality	℔ lb	9 ¢
3d quality	℔ lb	8 ¢
Sheet Cast Steel, 1st quality	℔ lb	15 ¢
2d quality	℔ lb	14 ¢
3d quality	℔ lb	12½¢

TIN.—DUTY Plates, Sheets, Tagger and Terne, 1¢ ℔ lb; Bars, Block and Pigs free.

Banca	℔ lb	.....	@ 22 ¢
Straits	℔ lb	21½¢	@ 22¼¢
English	℔ lb	21½¢	@ 22 ¢
Bar	℔ lb	23½¢	@ .....

Charcoal Tin Plates.

I C 10x14 225 sheets	℔ box	$5.25	@ 7.25
IC 12x12 225 sheets	"	5.25	@ 7.50
I C 20x28, 112	"	10.50	@ 14.50
I X 10x14 225 sheets	"	6.25	@ 9.25
I X 12x12 225 sheets	"	6.25	@ 9.50
I X 14x20, 112	"	6.25	@ 9.25
D C 12½x17 100 "	"	5.00	@ 5.50
D X 12½x17, 100 "	"	6.25	@ 7.00
For each additional X add	"	1.25	@ 2 00

Coke Tin Plates.

	Best.	Ordinary
I C 10x14	$4.75	$4.65 @ ...
I C 14x20		
I C 12x12	4.87½	4.75 @ ...
I C 10x20, gutters, 225 sheets	8.00	7.25
I C 20x28, 112 sheets	....	10.25

Terne Plates.

	Prime Char.	2d. quality	Coke.
C 14x20 M. F.	$7	.....	....
I C 14x20 Old Process	.....	.....	$6.87½
I C 20x28 "	.....	.....	14.25
I C 14x20	$4.75 @ 4.87½		
I X 14x20	6.25 @ 6.75		
I C 20x28	9.25 @ 9.75	8.75	8.62½ @ 8.75
I X 20x28	12.75 @ 14.50		
I C 20x200	13.50 @		

Tin Boiler Plates.

IXX 14x26, 2 sheets for No. 7, 112 sheets	@	$12.00
IXX 14x28, 2 " " No. 8, "	@	13.00
IXX 14x31, 2 " " No. 9, "	@	15.00

COPPER.—DUTY: Pig, Bar and Ingot, 4¢; Old Copper, 3¢ ℔ lb. Manufactured (including all articles of which Copper is a component of chief value), 35 % ad valorem.

Ingot, Lake	℔ lb	11¾¢	@ 12 ¢
Ingot, Baltimore	"	11 ¢	@ 11¼¢
Ingot Anchor	"	11¼¢	@ 11½¢
Braziers' Copper, ordinary sizes, 16 oz. ℔ sq. ft. and over		...	@ 16 ¢
Braziers' Copper, ordinary sizes, under 16 oz. and over 12 oz. ℔ sq. ft.	"	...	@ 18 ¢
Braziers' Copper, 10 oz. and 12 oz. ℔ sq. ft	"	...	@ 20 ¢
Lighter than 10 oz. ℔ sq. ft	"	....	@ 22 ¢
Circles less than 84 in. in diam	"	....	@ 20 ¢
84 in. diam. and over	"	....	@ 23 ¢
Segment and Pattern Sheets	"	...	@ 20 ¢
Locomotive Fire-Box Sheets	"	....	@ 19 ¢
Sheathing Copper, over 12 oz. ℔ sq. ft	"	14¾	@ 15 ¢
Bolt Copper	"	....	@ 16 ¢
Copper Bottoms	"	18	@ 19 ¢
Nickel Plated Sheathing	"	.....	@ 35 ¢
" " for boilers	"	.....	@ 37 ¢
Plating extra	"	25 ¢	@ 37 ¢
Flat Copper Boiler Bottoms or Pit Bottoms, cut to special sizes	"	....	@ 21 ¢

Tinning.

14x48, by the case	℔ sheet,	8¢
14x48, less than case	"	8¢

For tinning both sides, double the above amount.

O'Neill's Patent Planished Copper.—Net.

14x48

14 and 16 oz. and heavier	30¢	By the case	℔ lb 29¢
2 oz. and lighter	33¢	" " "	32¢

Boiler Sizes.

7 in., 14x52. 8 in., 14x56. 9 in., 14x60.

4 and 16 oz. and heavier	32¢	By the case	℔ lb 31¢

(And all sizes not over 20 in. wide.)

24x48 and 30x60.

4 and 16 oz. and heavier			℔ lb 34¢
2 oz			" 37¢

Copper Wire.—*(See Wire.)*

Sheathing Metal.

Yellow Sheathing Metal, ℔ lb	20¢	@ ...

BRASS AND GERMAN SILVER.

Crown & Sharpe's Gauge the Standard for Metal; Old English Gauge the Standard for Wire.

Brass Manufacturers' Price List, January 17, 1884	dis. 20	@ 30 %

LEAD.—DUTY: Pig, $2 ℔ 100 lb; Old Lead, 2¢ ℔ lb; Pipe and Sheet, 3¢ ℔ lb.

American	4.80 @	5 ¢
Bar	5½ @	5¾¢
Pipe	6¼¢, dis	20 %
Block Tin Pipe		40¢
Tin Lined Pipe	15¢, dis	20 %
Sheet	7¼¢, dis	20 %
Shot, ℔ bag	Drop, $1.40; Buck,	$1.65
Chilled Shot, ℔ bag		$1.65

ANTIMONY.

Hallett's	℔ lb	9 @	9½¢
Cookson	"	9½ @	10½¢

SPELTER—Duty: Pigs, Bars and Plates, $1.50 ℔ 100 lbs.

American, cash	4⅝ ¢ @	5¢
Bergenport		9¢

ZINC—Duty: Pig or Block, $1.50 ℔ 100 lbs. Sheet, 2½¢ ℔ lb.

600 lb casks	5.40 @ 5.60¢
Zinc.—Open	6 @ 6¼¢
Zinc Tubing	dis. 10 @ 20 %

Zinc Tubing—Dis. 25 %.

Plain	.27
Fancy	.33
Scotch and Extra Patterns	.36

BABBITT METAL.

N. P. U	℔ lb 6½ @	7¢
X		.10¢
X X		.15¢
J. B		.30¢

WIRE.

Market Wire.—Put up in 63 lb bundles.

Nos. 00 to 9,	10, 11,	12,	13, 14,	15, 16,	17,	18,
	10	11	11½ 12½	14	15	16
Bright Market Wire						dis 70 %
" Charcoal						dis 50 %
" Bale Wire, Nos. 7 to 12						dis 65 %
Annealed Market Wire						
" Fence Wire, Nos. 8 and 9,					dis	70 %
" Grape Wire, Nos. 10 to 14						
Coppered Market Wire						dis. 65 %
" Bale Wire, Nos. 7 to 12						dis. 60 %
Galvanized Market Wire					dis	60 %
" Fence Wire						

Stone or Weaving Wire.

Nos.	16	17	18	19	20	21	22	23	24	25	26
Cents	14	15	16	19	20	21	22	23	24	25	26
Nos.	27	28	29	30	31	32	33	34	35	36	..
Cents	28	29	30	32	33	35	37	40	45	55	..

Nos. 16 to 18	dis. 70 @	70 %
19 to 26	"	70 %
27 to 36	" 75 @	75 %
Galvanized Stone Wire	"	50 %

Steel Wire.

Cast Steel, Steel Wire list	dis. 50 %

Brass and Copper Wire.

Old English Gauge the Standard.—Dis 50 @ 80

	Common High Brass	Low Brass	Gilding Bronze and Copper.
All Nos. to No. 16, inclusive	$0.22	$0.26	$0.30
No. 17 and 18	.23	.27	.31
" 19 and 20	.24	.28	.32
" 21	.25	.29	.33
" 22	.26	.30	.34
" 23	.28	.32	.36
" 24	.30	.34	.38
" 25	.32	.36	.40
" 26	.35	.39	.43
" 27	.38	.42	.46
" 28	.42	.46	.51
" 29	.45	.49	.54
" 30	.48	.52	.62
" 31	.51	.55	.67
" 32	.55	.59	.73
" 33	.59	.63	.82
" 34	.64	.68	.95
" 35	.70	.74	1.30
" 36	.76	.80	1.50
" 37	1.00	1.04	1.70
" 38	1.30	1.34	2.00
" 39	2.00	2.00	3.25
" 40	2.60	2.60	5.75

Spring Wire, 2 cents per pound advance. Whitened Wire, 3 cents per pound advance. Flat, Square and Half-Round Wire, 4 cents advance on Round Wire. Fancy Wire, not less than 10 cents advance on Round Wire. Spooling on one-pound Spools, 12 cents per pound extra. Spooling on ten-pound Spools or more, 2 cents per pound extra.

MISCELLANEOUS TINNERS' STOCK.

Solder.

½ & ½, Warranted		14½¢
Extra		13½¢
No. 1 Refined	11½ @	12 ¢
No. 2 Solder	11 @	11¼¢
Extra wiping	11 @	11½¢

Rivets.

Iron and Tinned, new list, Dec. 10, 1881	dis. 50 %
In bulk, new list, Dec. 10, 1881	dis. 45 %
Copper Rivets and Burrs	dis. 50&10@60 %

Nos.	7	8	9	10	11	12	13	14	1
℔ lb.	49¢	50¢	52¢	54¢	56¢	58¢	60¢	65¢	70¢

Stove Bolts.

American Screw Co.'s	dis. 65 %
R. B. & W.	dis.
R. & E. Mfg. Co.	dis. 70 %

FRENCH GLASS.

August 20, 1885. Per Box, 50 feet.

Single Thick

Sizes.	1st. E F H	1 E H	2d. H H	3d. H B
25 6 x 8 to 10 x 15	$11.50	$10.50	$10.00	$9.50
40 11 x 14 to 16 x 24	13.00	12.25	11.50	10.75
50 18 x 22 to 20 x 30	17.00	16.00	14.50	13.25
54 15 x 36 to 24 x 30	19.00	17.00	15.00	
60 26 x 28 to 24 x 36	20.00	18.50	16.25	
70 26 x 36 to 26 x 44	21.50	20.00	16.50	
80 26 x 46 to 30 x 50	23.50	22.00	19.00	
84 30 x 52 to 30 x 54	25.00	23.00	20.00	
90 30 x 56 to 34 x 56	26.00	24.00	22.00	
94 34 x 58 to 34 x 60	27.50	26.00	23.50	
100 36 x 60 to 40 x 60	31.00	28.00	26.00	

Double Thick.

Sizes.	1st. E F H D	1 E H D	2d. H H D	3d. H B D
25 6 x 8 to 10 x 15	$14.00	$13.50	$13.00	$12.25
40 11 x 14 to 16 x 24	17.00	16.00	15.25	14.50
50 18 x 22 to 20 x 30	22.00	20.50	19.00	
54 15 x 36 to 24 x 30	24.00	22.00	20.00	
60 26 x 28 to 24 x 36	26.00	24.00	21.75	
70 26 x 36 to 26 x 44	27.50	25.00	22.50	
80 26 x 46 to 30 x 50	30.00	28.00	24.50	
84 30 x 52 to 30 x 54	31.50	29.00	26.00	
90 30 x 56 to 34 x 56	33.00	30.50	28.00	
94 34 x 58 to 34 x 60	35.00	34.00	31.00	
100 36 x 60 to 40 x 60	38.00	36.00	34.00	

Sizes above—$15 per box extra for every 5 inches. Discount 75 @ 75&10 %.

PAPER STOCK, &c.

(Dealers' Selling Prices.)

	Cents ℔ lb.
White Shirt Cuttings, No. 1	6¾ @ 7
" No. 2	5¾ @ 6
Mill Assorted Whites	5 @ 5½
Unbleached Muslins	5⅝ @ 6
City Whites, No. 1	4¼ @ ...
City Whites, No. 2	2¾ @ 2⅞
New Canton Flannels	5 @ 5½
New Seconds, light	3⅝ @ 4
" dark	3 @ 3¼
Cotton Canvas	4¼ @ 4¾
Linen Canvas No. 1	4 @ 4¼
Seconds, City No. 1	1⅝ @ 1¾
Seconds, City No. 2	1 @ 1¼
Colors, ℔ cwt	40 @ 50
Manilla Rope	3 @ 3½
" Tarred	2½ @ 2¾
Gunny Bagging, No. 1	1⅝ @ 1⅞
No. 2	1½ @ 1⅝
Kentucky Bagging	4 @ ...
Burlap Bagging, No. 1	2 @ 2¼
Tar Shakings	1⅝ @ 2
Hemp Twine Stock	3½ @ 3⅝
Hard White Shavings, No. 1	3½ @ 4
Soft White Shavings, No. 1	2¾ @ 3
White Shavings, No. 2, Soft	2¼ @ 2¾
Mixed Shavings, part White	2¼ @ 2¾
Ledger and Writing	2¼ @ 2¾
Solid Stock	2¼ @ 2¾
Book Stock, No. 1, light	1 @ 1½
Old Newspapers	1¼ @ 1½
Pure Manilas	1¾ @ ...
Bogus Manilas and Hardwares, cwt	60 @ 100
Commons, ℔ 100 lb	40 @ 50
Binders' Board Cuttings	⅛ @ ⅜
Straw Board Cuttings, ℔ cwt	60 @ 70

PAINTS, OILS, &c.

Paints.

Black, Lamp—Coach Painters'	℔ lb	22 @ 24¢
" Ordinary		6¢
Black Ivory Drop, fair		13 @ 15¢
" " best		25¢
Black Paint, in oil	kegs, 8¢; assorted cans,	11¢
Blue, Prussian, fair to best		40 @ 55¢
" " " in oil		45 @ 55¢
" Chinese dry		70¢
" Ultramarine		18 @ 30¢
Brown, Spanish		1¼¢
" Van Dyke		10 @ 12¢
Dryers, Patent American	asst'd cans, 9¢; kegs,	7¢
Green Chrome		15 @ 22¢
" " in oil		14 @ 18 @ 25¢
" Paris	good, 20¢; best,	25¢
" " in oil	good, 30¢; best,	35¢
Iron Paint, Bright Red	℔ lb	2¼¢
" Brown	"	1½¢
" Purple	"	3¢
" Ground in oil, Bright Red	"	6½¢
" " " Red	"	5½¢
" " " Brown	"	5½¢
" " " Purple	"	6¢
Litharge		6¼¢
Mineral Paints		2 @ 4¢
Orange Mineral		10¢
Red Lead American		6½¢
" Venetian (Eng.) dry		$1.65 @ $1.70
" " in oil	asst'd cans, 11¢; kegs,	8¢
" Indian Dry		9 @ 12¢
Rose Pink		10 @ 13
Sienna, American Raw, powdered		4¢
" Burnt, powdered		4½¢
" " in oil		10 @ 16 @ 20¢
" Raw		11 @ 15 @ 25¢
Umber, Burnt, powdered		4 @ 8¢
" " in oil		9 @ 12 @ 15¢
" Raw, powdered		4 @ 7½¢
" " in oil		9 @ 12 @ 15¢
Vermilion, Chinese		90¢
" English		53 @ 58¢
" American, Common		15¢
White Lead, American, pure dry		6¢
" " " " in oil		6¼ @ 6½¢
White Paris, English Prime		2 @ 2½¢
Yellow Ochre, French		$1.75
" " in oil	asst'd cans, 11¢; kegs,	8¢
" Vermont	in casks,	1½¢
Yellow Chrome		17 @ 27¢
" in oil		14 @ 18 @ 25¢
Zinc White, American No. 1, dry		5 @ 6¢
" No. 1, in oil		9¢
" French (Paris Dry)		5½ @ 7½¢
" in oil		10 @ 11¢

Oils.

Bleached Whale, ℔ gal		54 @ 55¢
" Sperm		95¢
" Elephant		68¢
Drilling		40¢
B. & R. Best Valvone Cylinder		70¢
Engine		50¢
Fish Oil, Pressed		32 @ 34¢
Lard, Prime Winter		51 @ 52¢
" No. 1 Extra		49¢
Linseed, Raw, in casks and bbls		44 @ 45¢
" Boiled, " "		48 @ 49¢
" Western, " "		41 @ 42¢
Calcutta		43¢
Machinery		40¢
M'ners' Oil		35 @ 45¢
Neatsfoot		60 @ 70¢
Signal		50¢
Tallow		58¢
West Virginia		11 @ 18¢

Sundries.

Asphaltum, Cuban, ℔ lb		6½ @ 9¼¢
" Trinidad Refined	℔ ton,	$27.80
Benzine	℔ gal,	8½ @ 9¼¢
Chalk, ℔ 100 lb		45¢
" Block		¾¢
Crucibles No. 14 and upward, per number		3¾¢
Grain Emery, 300 lb kegs		3¾ @ 4¢
Flour Emery, finest quality		2½¢
Frostings		40¢
Glue, White		24 ℔ 35¢
" Sheet		20¢
Glaziers' Points, Zinc, ℔ box		$4.75
Gum, Copal		38¢
" Damar		25¢
" Shellac, English		30¢
" " dark		25¢
Mineral Wool, ordinary, ℔ lb		1 @ 1¼¢
" " extra		3 @ 3½¢
Pumice Stone, selected Lumps		3 @ 6¢
" " powdered		2¾ @ 3½
Pine Tar, bbls		$2.50 @ $2.75
Pitch		$1.60 @ $1.70
Plumbago E. I. Po., ℔ lb		4 @ 6¢
" American, ℔ lb		6 @ 10¢
" Gun Powder Glazing, ℔ lb		10¢
" Shot Polish ℔ lb		10¢
Putty, in bladders		2¼¢
" in bulk		1¾ @ 2
Rosin—Common and Good—Strained		$1.35
" E & F		$1.50 @ $1.75
" G & H		$2.00 @ $2.02½
" I & K		$3.62½ @ $4.15
" M & N		$4.75 @ $5.15
Spirits Turpentine, ℔ bbl		38½ @ 39¢
Stove Polish, Dixon's	℔ gross	$5.50
" Rising Sun	"	5.50
" Gem	"	4.00
" Jet Black	"	3.00
Waste, No. 1 Cop		9¢
" No. 1 White Machine		9¢
" No. 2 White Machine		8½¢
" No. 1 Colored		6½¢
" No. 2 Colored		6¢
" Washed Machine		8½¢
Whiting, Spanish, ℔ 100 lb		60¢

INTERCHANGEABLE
LOCK-CORNER SHELF BOXES.
Screw Cases, &c.,
FOR THE HARDWARE TRADE.
S. R. GREEN,
12 Murray St., New York.

ESTABLISHED 1855. INCORPORATED 1882.

Began Making STEEL NAILS July, 1884.

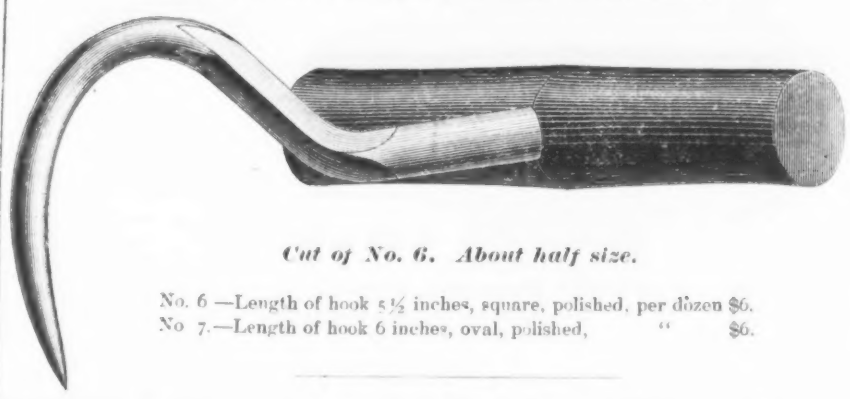
JEFFERSON IRON WORKS
STEUBENVILLE, O.
STEEL NAILS

OFFICE AND WORKS:
STEUBENVILLE, OHIO.

STEEL EDGE DUST PAN CO.
6 EXCHANGE PLACE,
BOSTON.
ALWAYS HAS A STRAIGHT EDGE & FITS CLOSE TO THE FLOOR.
WARRANTED TEMPERED STEEL-EDGE 1¼ IN WIDE.

Superior Cast Steel Hay Hooks

WITH DARK WOOD, POLISHED HANDLES.



Cut of No. 6. About half size.

No. 6 —Length of hook 5½ inches, square, polished, per dozen $6.
No 7.—Length of hook 6 inches, oval, polished, " $6.

HUMASON & BECKLEY MFG. CO.,

New Britain, Conn., 80 Chambers Street, New York City, 528 and 530 Market Street, San Francisco, Cal.

CATALOGUES FURNISHED ON APPLICATION TO DEALERS ONLY.

SOLE and ONLY Agency of the Wm Rogers Mfg. Co. ever established in the City of New York. V. P. Humason, Agent.

LEAVITT'S
Improved Screw Driver with Barbed Tang.

Cast-Steel Blade.

Patent Applied For.

A BLADE THAT WILL NOT PULL OUT

Nor Ferrule get loose or come off. The Best Goods for the Money extant.

Observe these prices are per gross. Divide by 12 and you get the price per dozen.

1½,	2,	3,	4,	5.	6,	8,	10, inch.
$2.50,	$3.75.	$8.33.	$10.81,	$13.33.	$15 83,	$23 33,	$26.67 *per gross.*

1½ and 2 inch packed in boxes of two dozen each. All the other sizes in one dozen boxes. In barrels, 1½-inch, $2.33; 2-inch, $3.00.

Kitchen Knives, two dozen in box, $4.17 per gross; Shoe Knives, two dozen in box, $5.00 per gross; Can Openers, one dozen in box, $6.67 per gross; Can Openers, in barrels, $5.83 per gross.

Discount, 25 per cent.

Manufactured by *THE NEW ENGLAND SPECIALTY COMPANY.*

Sole Agents for New York, New Jersey, Delaware, and the entire West, Southwest and Northwest:

THE ALFORD & BERKELE CO., 77 Chambers St., P. O. BOX 2002, New York.

THE JENNINGS & GRIFFIN MFG. CO., Sole Proprietors of the

L'Hommedieu Auger Works.

The Oldest Auger Works in America. Established by Joshua L'Hommedieu in 1818.

MANUFACTURERS OF "L'Hommedieu" { *Ship Augers and Ship Auger Bits. Ship Auger Pattern Car Bits. Single Twist Boring Machine Augers.*

TRACY'S TRENAIL AND SCOTCH PATTERN AUGERS.

These Augers and Bits are designed especially for boring hard wood. Special sizes of Machine Augers and Bits, Turned Shank, *Ship Auger Pattern*, furnished promptly to order.

N. B.—As inferior Ship Augers are now sold on the market under the impression that they are made by experienced mechanics, we would say that we have at our L'HOMMEDIEU and WATROUS shops the **only** experienced Ship Auger makers in the United States. We not only have the skilled labor but the best equipped shop for manufacturing this class of goods in the world. Our forging room is entirely new, with new drops, new trip-hammers and every facility in the way of labor-saving tools that can be devised. The "L'HOMMEDIEU" name has been before the public for more than 65 years. Goods bearing the trade-mark of **L'Hommedieu** or **Watrous** are fully warranted.

C. E. JENNINGS & CO., 69 Reade and 87 Chambers Sts.

THE WILMOT & HOBBS MFG. CO.,

Cold Rolled Iron and Steel,

For Blanking, Stamping, Cupping and Drawing.

BRIDGEPORT, - - - - - - CONN.

ESTABLISHED 1866

S. CHENEY & SON · MANLIUS N.Y.

MANUFACTURERS OF LIGHT AND MEDIUM WEIGHT

GRAY IRON CASTINGS

OF ALL DESCRIPTIONS TO ORDER.

PATTERN MAKING & JAPANNING · CORRESPONDENCE SOLICITED.

ALEXANDER BROS
BEST OAK BELTING
PHILADELPHIA.

ELIZABETHPORT STEAM CORDAGE CO.,

MANUFACTURERS OF MANILA, SISAL AND TARRED

CORDAGE OF ALL KINDS.

E. M. FULTON.
D. R. WHITLOCK.
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BINDER TWINE A SPECIALTY.

46 South Street, NEW YORK.

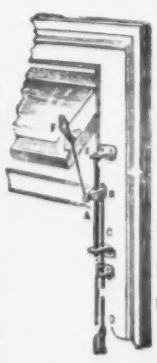
This is the latest and most improved combined Punch and Shear, being the only one that the operator can stand by his work and handle his lever, being in position to handle both at the same time.

A full line of Conductor Hooks, Ice Tongs and Children's Carriage Springs.

Write for prices and circulars. Name this paper.

PRICE, $30.

The Woodruff's Patent Celebrated American Suspending Eave Trough Hanger. The best in the world. Manufactured by GEO. W. HEARTLEY, Toledo Spring and Variety Works 301 St. Clair St., Toledo, Ohio.



THE REIHER IMPROVED
Self-Locking
TRANSOM LIFTER

answers equally well for all Transoms

Hinged at the top.
Hinged at the bottom.
Hinged at the center.

F. A. REIHER,
Manufacturer,
11 and 13 S. Canal St., Chicago

Send for catalogue.

Cut showing the parts belonging to the transom lifter:
A. The locking-bar.
B. The self-locking adjusting block.
C. The operating rod.
D. The lower bracket.
E. The lifting arm.
F. The transverse bracket.

Foreign Markets.

FRANCE.

PARIS, December 11, 1885.—*Metals.*—The better demand alluded to in our last report having subsided again, except so far as Spelter is concerned, the market has flattened once more, and all metals are easier and lower with the exception of Spelter, which has improved. We quote toward the close in francs ₱ 100 kg: *Copper.*—Chili Bars, 107.50 @ 112.50; Ingots and Slabs, 117.50; Best Selected, 125.25, and Pure Corocoro Ore, 112.50. *Tin.*—Banca, 255; Billiton, 250; Straits, 251.50; Australian, 252.50, and English, 249; *Lead*, 30.50 @ 31.50, and *Spelter*, 40.50 @ 41. *Iron.*—The Iron markets in France still show great weakness; in this city Merchant cannot be quoted any better than 12.50 @ 13 francs ₱ 100 kg. Nor is there much probability that any improvement will occur in this respect till we get fully into the new year, when after squaring their books consumers may feel better disposed to entertain fresh proposals. Our Valenciennes correspondent expresses himself about the situation in that important district to the following effect: "Both makers and dealers in this basin are getting on from hand to mouth only; the former do not feel inclined to sell any more than they can help doing at ruling ruinous rates, while dealers fill the current orders they receive and are indifferent about increasing their holdings so near the close of the year. Gradually the price at Valenciennes has dropped from 14 to 12.50 francs Merchant Iron, and may decline to 12 francs, Beams selling as low as 11 francs. Sheets, on the other hand, are wanted at rising figures, No. 2 commanding 14.50 and Boiler Sheets 17.50 @ 27 francs.—*Moniteur des Intérêts Matériels*

BELGIUM.

BRUSSELS, December 11, 1885.—*Iron.*—Since the 24,000 tons of Old Iron Rails were sold to Messrs. Tardy & Benech, of Savona, the Pig Iron market has been stiffening up a little in Belgium, so that common Luxembourg Puddling Pig would now be hard to procure at 4 francs ₱ 100 kg. The Iron market in general, it is true, does not exhibit any perceptible improvement yet, but unless a maker is financially in distress you cannot get him to submit to any concessions on the ruling cash rates, and even then he will sell no more than is absolutely necessary to set him at ease and enable him to wait for better times. Those having a run of orders, however moderate, will also refuse to sell at present rates. On the 30th inst. an important adjudication will come off to furnish the Government railroad lines metallic sleepers. Some seem of opinion the weight of 75 kg. will be adopted for them, experience showing that those of 55 kg. introduced in Holland are too light, but it is thought the Government will fix upon 60 to 65 kg., perhaps the latter. Meanwhile our German neighbors, the Bochum and Osnabruck works and the Ougrée Co., have made a Steel Rail contract to furnish the Adriatic Railroad Co. 14,000 tons at 132 francs ₱ ton. At Charleroi Merchant Iron has sold very low, say at 9 francs ₱ 100 kg. and Beams at 9.50. This is the lowest price that has been known in the Belgian market, and is not likely to be repeated as matters stand at present. *Coal* is firmer, in view of the probability that some favorable freight arrangement will be arrived at with the Government railroads to facilitate the export to France.—*Moniteur Industriel.*

GERMANY

HAMBURG, December 11, 1885.—*Iron.*—Our Dortmund correspondent reports that the better feeling that has been prevailing in Rhenish Westphalia and the Siegen district has been further strengthened. At Siegen the restricted output works satisfactorily in the Pig-Iron branch, and there is now great firmness, especially since Iron Ore is getting scarcer and is again tending upward, while at the same time Coal and Coke remain out of proportion high in price. But it was about time that the output should be restricted, for during the first 10 months the joint German make of Pig, including Luxembourg, reached 3,128,990 tons, against 2,982,846 in 1884, being an excess of 146,144 tons. In October the production was made up of 168,598 tons of Puddling Pig, 12,436 Spiegel, 37,792 Bessemer, 62,650 Thomas and 34,892 Foundry Pig. In Upper Silesia there have been several meetings to perfect a general reduction of the Pig Iron output. Interests being wide apart and in several instances peculiarly situated, because tied up with the Silesian branch works in Russian Poland, it is, of course, not an easy matter to get all makers to submit to the restrictions and control of a common syndicate, yet the necessity which there is of something of the kind seems to be acknowledged by all alike, and there is great hope that the year will not come to a close without a final agreement acceptable to all. After a more rational state of affairs shall thus have begun to prevail in the Iron industry in Germany and gradually extend to most of its branches, the spring trade will rest on a surer foundation, and better times may be vouchsafed us. *Metals* have been moderately active and unaltered, except Lead, which is improving.—*Borsenhalle.*

HOLLAND.

ROTTERDAM, December 7, 1885.—*Tin.*—The market opened with a quiet feeling, but soon after quite a demand set in, a large business was done, and Banca spot rose to 57 guilders ₱ 50 kg., and 56.87½ from the coming sale, while Billiton, spot, brought 56, and March delivery, 56.25. At Amsterdam the dealings were as extensive as they were here, especially in near futures, distant ones being neglected, the closing price being 57 for Banca and 56 for Billiton.

Statistics.

	Oct. 31, 1885. Slabs.	Nov. 30, 1885. Slabs.	Nov. 30, 1884. Slabs.
Banca stock on warrants.	16,900	30,065	45,232
Billiton stock here and at Amsterdam	20,868	20,568	35,150
Total	37,768	50,633	80,382
October and November deliveries of Banca	14,387	10,300	7,400
October and November deliveries of Billiton	7,800	8,300	6,892
Total	22,187	18,600	14,292
Banca deliveries during 11 months	113,308	123,608	111,933
Billiton deliveries during 11 months	98,234	106,504	97,610
Banca afloat	500	1,000	18,600
Banca retained for future auctions	90,176	79,911	81,959
Billiton afloat	32,800	21,300	30,187

—*Koch & Vlierboom.*

RUSSIA.

ST. PETERSBURG, December 10, 1885.—*Petroleum.*—There is a general complaint that the entire production of the Caucasus is getting into the hands of foreign capitalists. German capitalists control the Nobel Co. The Batum Naphtha Co. is French, and Mirsojem Brothers have sold out to an Anglo-German syndicate for 3,000,000 rubles.—*Journal de St. Petersbourg.*

AUSTRIA

VIENNA, December 7, 1885.—*Iron.*—While the Iron trade continues stagnant, great efforts are continually being made to reduce the output of Pig Iron generally through a general agreement among makers to that effect. Machine shops are nearly at a stand-still, and hands are being discharged by the thousand. Meanwhile Iron is lifeless, and we can quote nominally only: Pig Iron, 47 @ 52 florins ₱ ton; Merchant, 100 @ 125; Sheets, 150 @ 175, and Beams, 100 @ 110.—*Austrian Trade Journal.*

EAST INDIES.

PENANG, November 3, 1885.—*Tin.*—After declining from $30.30 ₱ picul to $30.10, the market recovered to $30.85, with sales of 4500 piculs to Chinamen and 2850 to Europeans, the receipts amounting for the fortnight to 7500 piculs. Export from January 1 to the 1st instant 129,430 piculs to England, against 106,405 last year. *Exchange*, four months' bank, 3/5⅝.—*Schmidt, Kustermann & Co.*

COLOMBO, November 7, 1885.—*Plumbago.*—The market has been depressed, but bottom seems to have been reached, inasmuch as holders cannot possibly submit to further concessions. The closing quotations are: Large Lumps, £13. 5/; Ordinary, £12. 5/; Chips, £9. 10/, and Dust, £6. 15/, cost and freight per sailing vessel to London, and 5/ additional if per steamer.—*Volkart Brothers.*

PERU.

IQUIQUE, October 20, 1885.—*Nitrate.*—The total exports hence and from other points on the coast this year is likely to reach 9,191,072 quintals of 46 kg. The high price of $4.20 will cause makers to sell out during the remainder of the year all they possibly can, so that it is not believed the unsold balance will exceed 250,000 quintals on December 31 next. The actual shipments during the first nine months were 6,251,361 quintals, against 8,719,364 in 1884, and 8,283,994 in 1883, leaving a stock on hand on October 1 of 738,113. The monthly average production barely reaches 700,000 quintals.—*El Comercio.*

Hardware Novelties.

New Automatic Ash-Sieve.

The accompanying illustrations show an automatic ash-sieve which is being introduced by Charles Leffingwell, 58 Eighth avenue, Newark, N. J. The article consists of two parts, combined as shown in Fig. 1 of the engravings. The bottom of these is

New Automatic Ash Sieve.—Fig. 1.—Manner of Using Leffingwell's Automatic Ash Sieve.

the ash receptacle, above which rests the ash-sieve, which is shown inverted in Fig. 3. The sieve part is provided with a hopper-like mouth at the top, into which ashes may be poured, as represented in Fig. 1. It is also provided with a lid which is raised as ashes are poured in. The contents of a hod emptied in this manner are quickly sepa-

Fig. 2.—Ash Receptacle.

rated, the ashes and fine particles passing through the mesh of the sieve into the bottom part, while the coal is delivered into a box placed for the purpose below the sieve. The work is performed with great rapidity. Before the hod can be returned to the floor the coal will be found in the box in front of the sieve perfectly separated from the ashes.

Fig. 3.—Hopper and Wire Mesh Inverted.

The capacity of the ash-receiver is such as to permit the accumulation of four or five days to be stored in it under ordinary circumstances. The ash-receiver is provided with handles for carrying it to the dumping pile. The sieve is also furnished with a handle for lifting on and off, as may be required. A special advantage to which the maker directs attention is that very little dust accompanies its use.

The Model Screw Top.

The Model Screw Top Co., Mayville, N. Y., are manufacturers of the screw top shown in the cut. The article is made either all of tin or else of zinc, with tin base, the

The Model Screw Top.

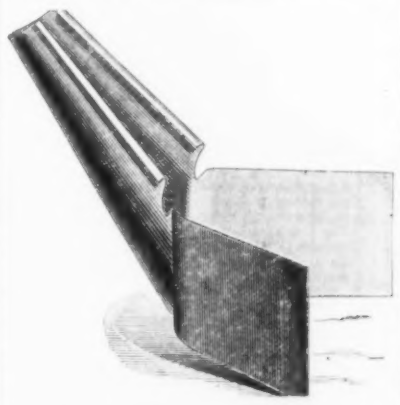
former being a little lower than the latter. The principal feature of this screw top is the attachment by which the two parts are fastened together and which prevents the cap being lost. At the middle of the cap and soldered to it is an iron rivet which projects about ⅜ inch. This rivet passes through a hole in one end of a bent tin arm, the other end being hinged to the base by means of a wire loop. This arm is strengthened by a shallow rib stamped in it, which prevents it from being bent out of shape. The arm does not interfere with the screwing or unscrewing of the cap, and when open the cap can be thrown back entirely out of the way of the nozzle.

Solid Spout Miner's Lamp.

Hunt & Connell, of Scranton, Pa., are now actively engaged in introducing, a form of miner's lamp which they designate as the Solid Spout Lamp. The general features of this article are clearly indi-

Solid Spout Miner's Lamp.

cated in the general view presented, while the cut of the spout section shows the particular features of its construction which give it the name and render it specially desirable for use. The lamp is composed of the smallest possible number of pieces. The body of the lamp and the spout are struck up from a single piece, the spout being finished by locking and grooving along the top, as will be understood by reference to the second engraving. This construction avoids a soldered seam between the base of the spout and the body of the lamp, and successfully overcomes the great annoyance to miners of their lamps becoming unsoldered by the flame being thrown back against the body by the strong drafts of air in the mines to which they are frequently exposed. The breast of the lamp is drawn up in brass, and is also of a single piece. The construction of the hinge and lid has been very carefully considered, and is of a character to insure durability and satisfactory wear. The hook for fastening the lamp to the miner's hat is placed directly over the seam in the back of



Body and Spout as Struck Up.

the body, forming an excellent construction, and at the same time adding to the general appearance of the article. The makers claim that the lamp here illustrated is the only one in the market that has the advantage of a solid breast and collar.

A Torpedo Catcher.

The construction of torpedo catchers was as much a necessity in naval warfare after the development of the torpedo system of small, quick-steaming torpedo craft as armored protection for battle ships became in consequence of the growth of the gun. The catchers, or police of the sea, do not differ except in bulk and speed from the active and dangerous little enemies which they are intended to capture or destroy, and in this respect the British Admiralty would appear to have applied the old detective principle of setting a thief to catch a thief. The first of the new craft yet afloat was tried in Stokes Bay, near Portsmouth, with remarkable results, not only as regards speed, but also as regards maneuvering power. This latter quality of the torpedo catcher was even more noteworthy than the former, and has been secured by the application of a principle which, though successfully tried in steam pinnaces and launches, and in various submarine miners built for the Royal Engineers, had not previously been adapted to first-class torpedo vessels. During the past four years we have on various occasions noticed the gradual development of the invention of Mr. John Samuel White, of East Cowes, which is now popularly known in the service as his "turn-about" system. Boats built according to this plan have their dead wood removed in order to obtain facility in turning, and are fitted with an inner and an outer rudder, simultaneously actuated, either of which would suffice to steer the vessel in the event of the other being lost or disabled.

The present experimental torpedo-boat was undertaken by Mr. White for the purpose of demonstrating the applicability of his invention to larger vessels, and with a view of her acceptance by the Admiralty on her fulfilling all the conditions guaranteed. She is considerably larger than any of the existing torpedo craft in Her Majesty's navy, being 150 feet long, 17 feet 6 inches broad and 9 feet 6 inches deep. Her displacement is about 125 tons. Her lines resemble those of similar vessels now in use, but she is fitted with a turtle deck and a spur ram. Like the others, she is built of thin steel, and has a conning tower amidships, from whence she will be steered in action. Messrs. G. E. Bellis, of Birmingham, the makers of all the machinery of Mr. White's boats, joined with him in the undertaking, supplying compound engines of the three cylinder type, the high pressure cylinder being 20 inches and the two low pressure cylinders 24 inches in diameter, the whole being supported on light steel columns. The stroke is 18 inches. Great care has been taken in the design to keep the weights as low as possible, having due regard to efficiency. There are two air pumps driven off the low-pressure crossheads, while the feed pumps are driven direct from the crank shaft. Steam is supplied by two locomotive boilers, with the feeds so arranged as to insure an equal supply of water to each boiler; and, as the result of the trial, the possibility of successfully employing two boilers with forced draft without difficulty either as regards the feed or priming was clearly demonstrated. A great feature in the design is the division of the boiler-room by a longitudinal water-tight bulkhead, the connections being arranged so that either boiler can be worked independently in case of accident. The vessel is also steered by steam.

The trial, which was conducted by Mr. White and Mr. Morcom on the part of the builders and engineers, was witnessed by Commander the Hon. R. F. Sandilands, of the Steam Reserve; Mr. T. Soper, R. N., and Mr. Smale, of the Controller's Department of the Admiralty; Chief Inspector of Machinery Alton and Messrs. Mayston and Gowing, of the dockyard. Admiral Herbert and a number of naval officers also watched the running from the deck of the Camel. The weather was somewhat boisterous, but notwithstanding the state of the sea the vessel was remarkably steady, and also free from vibration when going at her maximum speed. The total weight on board was 25 tons, 15 tons representing coal and 10 tons (furnished by iron ballast) her armament of Whiteheads and rapid-firing guns. Provision, however, has been made for carrying 35 tons of coal in the bunkers, while the space forward and aft for the accommodation of officers and crew and stores is unusually large. Six runs on the measured mile were first made for the purpose of ascertaining the speed under the special conditions of load, which resulted in the realization of a mean speed of 20.79 knots, the mean boiler pressure being 126 pounds, the revolutions 319 per minute and the indicated horse-power 1387. The highest speed in the direction of the wind was 22.43 knots, and the following times which it took to complete the miles will show the regularity with which the speed was maintained: With the wind, 2′ 43″, 2′ 40½″ and 2′ 40½″ (repeated). Against the wind, 3′ 9″, 3′ 7″ and 3′ 5″. The average indicated horse-power per square foot of grate was 23, which was maintained with a mean air pressure in the stoke-holes of 2½ inches, which was considered a very high result. The vessel was afterward tested in the usual manner for maneuvering power. At full speed, with the helm hard over 30°, the starboard circle was completed in 1′ 17″ (238 revolutions of the engines) and the port circle in 1′ 12″ (270 revolutions). At half-speed the starboard circle was completed in 1′ 14″ (237 revolutions), and the port circle in 1′ 15″ (246 revolutions). The diameter of the circles was about a length and a half of the boat, or 225 feet. The craft was finally run for three hours' continuous full-power steaming to test the endurance of the mechanism. No mishaps occurred and the speed and revolutions were maintained throughout. The absence of vibration during the trial, as well as the very slight inclination on the helm being put hard down by the steam steering engine, was the subject of general remark, and Mr. White and Messrs. Belliss were congratulated at their joint success in the building and engining of what is regarded as the best type of torpedo catcher.—*London Times.*

A Judicial Opinion on Discrimination in Freights.

The question of railroads discriminating against certain shippers has been definitely and positively fixed in Ohio by a decision rendered in the Supreme Court. Following is the syllabus in the case of Schofield, Shurmer & Teagle against the Lake Shore and Michigan Southern Railroad Co.:

1. A railroad company chartered under the statutes of this State is a common carrier of freights intrusted to it for transportation, and is vested by its charter with the right of eminent domain and other franchises of a public nature, and exercises public duties and those of a *quasi* public officer, and is subject to judicial control to prevent an abuse of the privileges and powers so granted.

2. Whether a common carrier, at common law, in the ordinary case—where no facts exist making a discrimination among shippers, injurious or ruinous to some of them—is only bound to transport freight at a reasonable rate, and not necessarily at a rate equal to all or not, yet when the lower rate is either intended to give, or has the necessary effect of giving, an exclusive monopoly affecting the business and destroying the trade of other shippers, the latter have the right to require an equal rate for all under like circumstances.

3. Where such a corporation as a common carrier of freights, in consideration of the fact that a shipper furnished a greater quantity of freight than other shippers during a given term, agrees to make a rebate on the published tariff on such freight, to the prejudice of other shippers of like freights under the same circumstances, such a contract is an unlawful discrimination in favor of the larger shipper, tending to create monopoly, destroy competition, injure, if not destroy, the business of smaller operators, contrary to public policy, and will be declared void at the instance of parties injured thereby.

4. Such a contract of discrimination cannot be upheld simply because the favored shippers may furnish for shipment during the year a larger freightage in the aggregate than any other shipper, or greater than all others combined; a discrimination resting exclusively on such a basis will not be sustained.

5. Although a court will ordinarily look to the interest of the common carrier as an element in the case, the validity of such a contract will not be sustained by the courts simply because the business done under it is "largely profitable" to him.

6. Where it appears that the plaintiffs' business is such as to make him a frequent shipper, and a continuous series of shipments is necessary in conducting his business, and to secure a remedy would lead to a multiplicity of actions at law, the courts, in order to save a multiplicity of suits and to do full and adequate justice to the injured party, will intervene by injunction to prevent the threatened injury and wrong, and it is not a prerequisite on such a state of facts that plaintiffs first establish their rights by an action at law.

7. When a railroad company is a corporation consolidated under the statutes of several States, and its road reaches into several States, its illegal acts of injurious discrimination committed or threatened in this State to the business of others, either here or along the line of said railroad in this State or elsewhere, may be ignored by the courts of this State.

The End of a Great Enterprise.

While floating along on the top wave of popular favoritism the late Commander Gorringe conceived the idea, or some of his friends conceived it for him, that the man who could bring Cleopatra's Needle across the ocean could build ships and roll up interest for stockholders. A company was quickly formed with a capital of $1,000,000, of which $300,000 were paid up, and the American Shipbuilding Co. became a fact. Years ago the Reading Railroad Co., then in the hight of their influence and prosperity, determined to not only control the coal trade but monopolize American shipbuilding. A great strip of land was partitioned off from the coal-wharf property and extensive brick buildings put up. These shops were the most pretentious of any of the kind in the country, and covered a vast extent of ground. Running north and south on the west was a long, two-story peaked-roof building for offices, drafting-rooms, joiners' shop and wood loft; running parallel were the boiler shed, blacksmith's shop, paint shop, oilhouse and spar shed. But before the first keel was laid the affairs of Reading took a change and the shipbuilding scheme was relinquished. The shipbuilding company, of which Commander Gorringe was president, leased the shops and land. The rental was heavy, and the corps of men required to run the place very large. Competition between this yard and Cramps' and Roach's was active, and contracts had to be taken at unremunerative prices. Experience both in purchasing and selecting material was lacking, and it is said the financial management was bad. At all events the new enterprise soon landed high and dry on the rocks of bankruptcy. The 3000 ton iron screw steamers Clarence S. Bement and T. F. Oates, sister vessels, were built, the former for Jacob Ridgeway, and the latter for Starbuck, of New York. The Chatham, an iron steamer, the iron collier Frostburg and the iron schooners Redwing and Jonathan Knight were successively launched, each new vessel making the company poorer. The iron ferry-boat Transit was also constructed by Gorringe. During all this time, to all outward appearances, the company were enjoying the utmost prosperity. The pay-rolls were enormous. The crash came, and one morning poor Gorringe awoke to find his heart's idol shattered—all for which he had thrown up his honorable post in the United States Navy was lost, and the business was pronounced ruined past redemption. But so greatly did creditors and company associates respect Commander Gorringe that they agreed that he should become receiver of the estate. Through an arrangement he was to complete the vessels on the stocks. In order to do this additional sums had to be borrowed. Already the $300,000 of paid-in capital had been absorbed. Stockholders once enthusiastic had become *blasé* to glittering prospects held up before their eyes, and refused to complete their subscriptions. When the crash came, in March, 1884, debts for $250,000 had been incurred. As much more was now piled up in completing the unfinished vessels. In December of that year Commander Gorringe met with an accident while attempting to board a Pennsylvania train and injured his back. Cancer of the kidney resulted, and six months later—that is, in June last—the famous navigator of the obelisk died. John W. Hoffman succeeded to the receivership in the interest of the creditors, and recently the last vestige of Gorringe's conception disappeared.

The enormous wealth of New York is indicated by its amount of taxation, which for the present year is fixed at $34,853,529. The taxable valuation is about 70 per cent. of the market value. Last year the tax was $2.25 per $100. This year the rate was $2.40 per $100, owing to the fact that no bonds can be issued for improvements of any kind with the exception of an increased water supply. The advance of valuations of real estate in this city for the last 12 years shows a steady increase. For 1874 the total was $881,547,995; for 1875, $883,643,545; 1876, $892,428,165; 1877, $895,063,933; 1878, $900,855,700; 1879, $918,134,380; 1880, $942,571,690; 1881, $976,735,197; 1882, $1,035,203,816; 1883, $1,079,130,669; 1884, $1,119,761,597; 1885, $1,165,443,137. The valuations of personal property, on the other hand, have been steadily going down. Since October 1, when the books were opened, about $26,500,000 have been collected, which shows unusual punctuality.

We read that iron jewelry is being extensively worn, and that one knows not which most to admire, the elegance of the finished work, the skill of the molder or the fine quality of the metal that may be induced to assume such elaborate forms. Some of the articles, as brooches, have a beauty of network almost rivaling Italian filigree in gold, yet it is nothing but cast iron. The polish is perfect and not easily tarnished, even when exposed to the action of the carbonic acid of a crowded, ill-ventilated room. The luster is a clear, bluish, almost transparent sheen, from which the light is reflected as from the diamond. The polishing of the facets is performed upon an ordinary buff-wheel dressed with crocus.

SCIENTIFIC AND TECHNICAL.

Bricks and Tiles of Glass or Grit.

We take the following from the excerpt minutes of the British Institution of Civil Engineers: "The utilization of the heaps of residue from the operations of the looking-glass manufacture has been successfully effected, on the system of F. Motte, in the production of white bricks and stones. In polishing mirrors the surfaces are rubbed with platforms of wood framed in cast iron, interposing fine sandstone or white quartzose sand, with the addition of water. The water, as it escapes as mud, carries with it the sand employed in grinding, mixed with glass and cast iron. The proportion of glass as impalpable powder is about 15 per cent. of the weight of the sand, and there is 2 per cent. of iron. The muddy water is delivered into basins where the solid matters are deposited. The deposit is collected, and ultimately becomes enormous heaps. It is very absorbent, and holds at least 30 per cent. of water. The solid matter is dried to a convenient degree, brayed, kneaded and put into molds of the required form, in which it is subject to a pressure of about 2 tons per square inch. The pieces thus molded are dried, and burnt in a kiln at a temperature above that of melting glass, about 3000° F., the glass, by its melting, constituting the cement by which the silica is held together. The soda in excess at this temperature combines with the silica. The iron is reduced, and a perfectly white product is obtained. This new material is light; its density is only 1.50, while that of clay bricks is 1.85. This material, consisting of silica and glass, is usefully employed in chemical manufactures. The bricks are used to line lead chambers. They resist the action of sulphuric acid and hydrochloric acid. They are more or less compressed, according to their destination, and their power of absorption varies from 20 per cent. to 25 per cent. They are unaffected by frost. They have a crushing resistance of from 2½ to 2¾ tons per square inch, whether dry or after 40 days' immersion in water. The material, in mixture with other substances, makes fine clays, paving stones, &c. In architecture it is ornamental. It is homogeneous, and is easily cut. In price, bricks of the new material vary from £2 to £4 per thousand."

The Freezing Method in Tunneling.

A rather remarkable and novel piece of work is at present being carried out in the construction of a tunnel at Stockholm The tunnel passes through a hill on which are built residences of considerable size, the soil in many places consisting of a light wet gravel mixed with sand, not so wet as to form a really running mass, but sufficiently so as to cause great anxiety in connection with the foundation of the houses above, which, owing to the great depth of material, it would have been an exceedingly costly matter to underpin. Under these circumstances the contractor, Captain Lindmark, conceived the idea of freezing the troublesome material by means of cold air. The results of the freezing method have surpassed all expectations. The machine has only been at work for a few weeks, and already with its aid two five-story houses have been successfully passed under.

Tests of the Fahnehjelm Incandescent Light.

Light, Heat and Power publishes the following tests of the Fahnehjelm incandescent gas burners, made at Essen, Philadelphia and New York, respectively:

The following tests were made at Essen, Germany.

Consumption.	Ignition pressure.	Candle-power.	Candle-power, per cub. ft.
145 liters.	2 inches.	16.2	3.1
150 liters.	2 inches.	18.0	3.3
164 liters.	2 inches.	24.0	4.0

28.81 liters = 1 cub. ft.

Tests made November 16, 1885, at the Novelties Exhibition Building, with Lowe fuel gas (average of 20 observations):

Consumption.	Ignition pressure.	Candle-power.	Candle-power, per cub. ft.
5.64 cub. ft.	1.5 inches.	16.88	2.99

Tests made at No. 122 West Thirty-sixth street, New York City:

Consumption.	Ignition pressure.	Candle-power.	Candle-power, per cub. ft.
6.6 cub. ft.	1.3 inches.	23.0	3.48
5.5 cub. ft.	1.5 inches.	21.9	3.98
5.6 cub. ft.	1.0 inches.	19.6	3.50

Other tests recently made:

Consumption.	Ignition pressure.	Candle-power.	Candle-power, per cub. ft.
7.0 cub. ft.	2.2 inches.	21.3	3.05
5.6 cub. ft.	1.5 inches.	20.0	3.57

Skidding Lumber by Steam.

A recent issue of the *Lumberman's Gazette* contains an elaborate account of a method invented by Horace Butters, of Ludington, Mich., for skidding lumber, from which we take the following:

The machinery consists essentially of a hoisting engine, with drums operated by steam-power, upon one of which is wound the skidding rope, and around another of which passes an endless rope attached to a traveler which moves upon a guy rope fixed to some point distant from the hoisting machine. The hoisting machine is not materially different from such machines used for other purposes. The motive-power is furnished by a portable upright boiler. The engine has two cylinders which drive a shaft giving motion to the drums. The drums are loose on their shafts. The pinions driven by the main shaft have frictions on their inner faces, which are moved by means of quick screws, engaged with the friction on pinions, and cause drums to revolve. It will be seen that thus each drum can be put in motion or left at rest independently of the others. One drum is used for the loading line, another for the skidding line, and still another, which is called the "receding drum," is used for hauling the velocipede (to which the skidding is attached) back into the timber.

An ordinary logging road or railroad is built into the timber, or to the edge of swamps, and here a strong tree is chosen to which a ¾ or 1 inch steel wire cable is attached. This is stretched about 20 to 40 feet from the ground, out over the land to be logged, for a distance of 500 to 600 feet, and fastened to another tree, both trees being well guyed to prevent them from breaking. Just at the side of the track is placed a small but powerful hoisting engine provided with three drums and suitable clutches for operating them. On this wire tramway, as it really is, there is a two-wheeled velocipede, with an inch manila rope attached, so that it may be drawn back and forth over the tight wire rope. The bottom of the velocipede is further provided with a sheave block carrying a 1¼-inch manilla rope, one end of which is connected with a drum, the other being spliced into an ordinary pair of skidding tongs. This rope with the tongs is, by operating the receding drum, dragged into the swamp or woods and fastened to the log to be taken out, the engine started, and the log hauled under the velocipede, one end of the log being suspended in the air, the other dragging, and thus hauled over logs, brush, stumps, &c. (there being no roads cut for them, or "swamping," as it is called), to the track, and there loaded on the cars. The velocipede is then run back for another log, which follows in the path of the other. The engine and boiler are placed upon a little car or truck that may be easily removed from the main track and run into any position that is desired.

With ordinary working 30,000 feet have been taken from the woods where the trees were felled and loaded on the cars in the space of two hours, on a trial, and this with the service of 13 men. So strong and serviceable is the whole mechanism that with a single line of 600 feet in length at least 30 acres may be cleared by running the hoisting rope out on each side and beyond its limits, and by changing the terminus of the tram cable; and, when all the timber within its reach has been removed, the whole is taken down, packed on a car and set up in another locality. With a force of 16 men 50,000 to 60,000 feet are skidded, and in one day over 70,000 feet have been skidded and loaded on cars. There are four of these machines in operation in Michigan, Butters & Peters employing two. So completely does it do its work that 16 men are skidding and loading on cars an average of over 55,000 per day, besides timber for 50,000 shingles, and Mr. Wright, of the West Michigan Co., is authority for the statement that the total cost of putting logs down at the mill, taking them from the standing timber, all expenses of cutting, skidding, loading and railroading 4 miles included, does not exceed $1.25 per 1000. Any lumberman at all conversant with the business and expense of conducting the same by the old method can readily perceive that it is an advantage of 100 per cent to the operator at least. The machine, while located in one position, takes logs of any size from a distance of 600 feet on either side of it, over hills and over gullies and across swamps through which even an ox team could not wallow without a load, because of the depth of mud and water, and lands the logs in position on the flat cars of the railroad, ready for transportation to the mill. When the logs are all cleaned from 150 feet on either side of the wire cable, which extends 600 feet into the woods, another cable is picked up which had been previously laid and the work proceeds with very little interruption. The cable last used is then changed to still another point, and is ready for use when needed. In just 10 minutes from the time the last log was taken in on the one cable the other was stretched and a log was being snaked to the flat car thereon.

Heating Street Cars with Gasoline Gas.

The apparatus for heating the street-railway cars of Chicago with gasoline gas is described as being composed of a brass cylinder about 4 inches in diameter by 2¼ feet long, inside of which is a piston that is drawn into the cylinder by a spring whose tension may be strengthened or diminished by a small thumb-screw at the end. The cylinder is to be filled with gasoline and will hold 2 gallons, which is calculated to last 16 hours going full blast, so that one filling a day will be about all that is necessary. This gasoline is forced by the piston into a small copper tube connecting with the heater. At the end of this tube is a generator by which the gasoline is converted into gas, which, being lighted, produces a very hot flame. The heater is of cast iron and resembles half of a small barrel. It is divided into small compartments by partitions of fire-brick, thus allowing the flame to have full play over considerable surface. This surface, becoming very hot, radiates the heat, which, rising through the register, warms the car. The fumes from the gas escape by pipes leading under the car, and fresh air is brought into the car by similar means. This arrangement was tried last winter during one of the coldest days, and it worked, so far as heating went, to a charm, but the trouble was the frequent pumping it required to supply the air requsite to force the gasoline into the tube. This difficulty was overcome by the spring. The heat can be regulated by simply turning a thumb-screw, thus decreasing or increasing the supply of gas, which gives a proportionate amount of flame.

Palmer's Shipbuilding and Iron Co. have recently completed new steel works at Jarrow. The steel furnaces—four in number—are each of 15 tons capacity, and are constructed on what is known as "Bathos's" patent. There are four regenerators to each furnace, and the gas is manufactured in a double range of Wilson producers. The engines weigh over 200 tons, and are capable of exerting up to 6000 indicated horse-power. The cogging mill is made throughout of steel. It is intended for cogging ingots up to 5 tons in weight. The shears are capable of shearing blooms or slabs 30 inches wide by 9 inches thick, and are provided with hydraulic apparatus for regulating the length of the piece to be cut.

M. Scheurer-Kestner says Kœrting's apparatus may be employed at the head of the first lead chamber when the chambers are not preceded by a Glover tower; in this case their use is very economical, because the steam is utilized in the chambers. In other cases they can be only placed after the Gay-Lussac tower, and their action is much less economical, though regular and practical.

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(*Continued from page 1.*)

of the bar to the outer edge, so that the two pieces only touch at a point in the center, thus allowing a ready means of escape for the cinder when under the action of the hammer. The butts left on each end of the forgings are never less than 4 inches over the finished size, so that the scarfs can be thoroughly heated and plenty of force applied by the hammer before they are reduced to the correct scantling. The forgings are slotted to the dead lengths, all screwing being done away with. In place of screws, &c., straps are used to prevent any slipping or warping.

Lloyd's Visiting Committee, hearing of this process, on one of their annual tours, paid a visit to our works to inspect it. They ex-

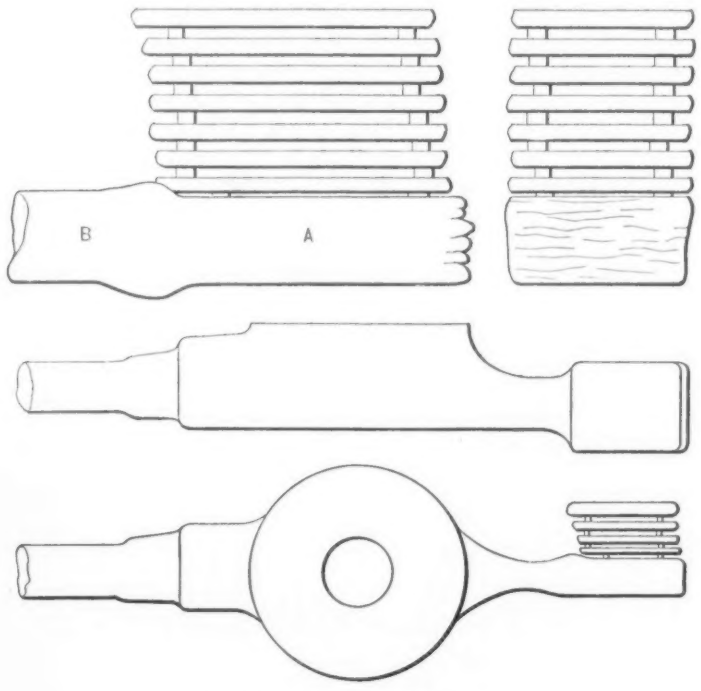

Fig. 7.—Method of Forging Stern Frame.

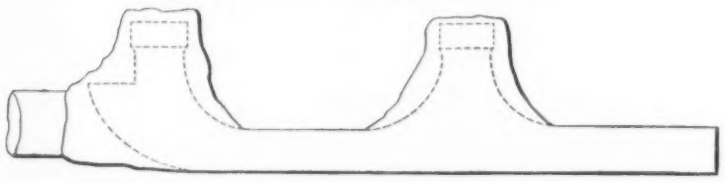

Fig. 8.—Keel-Piece.

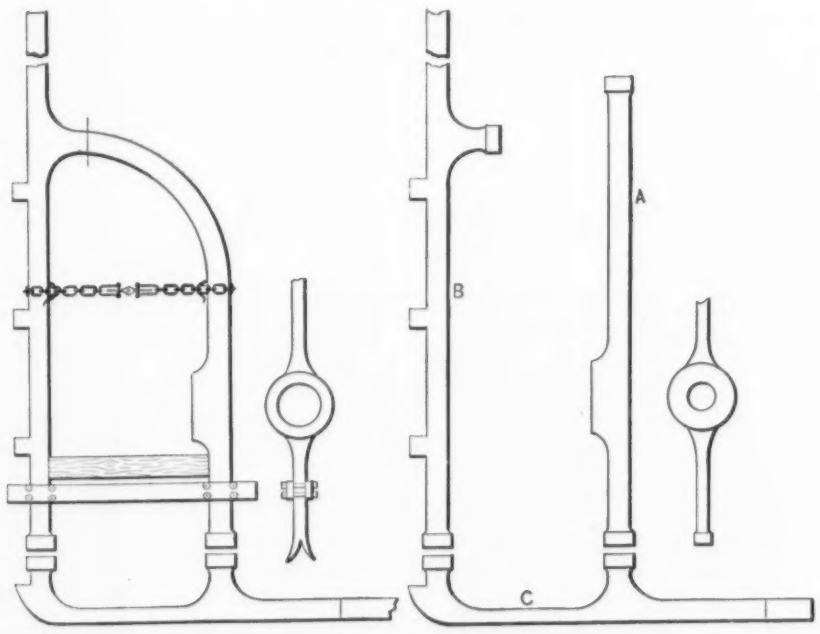

Fig. 10.—Arrangement of Screws and Tie Rods for Welding the Arch.

Fig. 14.—Forging a Stern Frame.

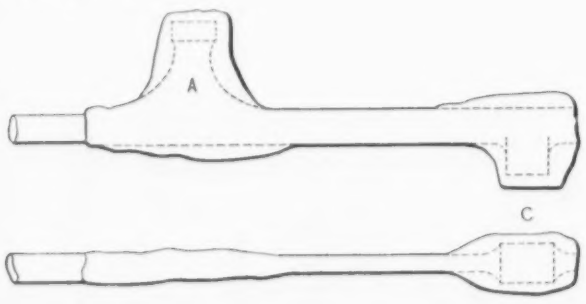

Fig. 16.—Forging the After Piece of Frame.

to the scrap heap, but two or three I have found which are here for your inspection. One of them, a piece 15 inches by 7 inches, marked D, Fig. 1, and another 12 inches by 6 inches, marked E, Fig. 4, were treated as described above. The third, F, Fig. 2, 10 inches by 7 inches, was broken cold under the hammer, requiring 11 blows from a 13-ton piston-rod, with a drop ranging from 6 feet to 9 feet, before it fractured; all showed perfect union.

Another piece, 9 inches by 5 inches, directly after welding, while still at a bright red heat, was bent alternately until the bar broke across without the weld showing the slightest sign of opening. I regret that I am not able to place this test, the most severe of all, before you, the pieces being at present in London. However, with the an 8-inch crank-shaft made by the same firm. The shaft was cast and machined and finished without being hammered in any way; the tests stood remarkably well, and the shaft appeared to be quite as good as an ordinary forging.

Mr. T. Mudd: We are asked to discuss this subject, but really it seems to admit of very little discussion. It appears to be obvious to any one that the plan of procedure adopted by Mr. Putnam is immensely superior to that formerly in vogue. I have always understood that to make a good weld it is essential to strike hard at the first onslaught. Good welders appear to do this, and it seems to me that the main idea in Mr. Putnam's system beyond the beveling to let out the cinder is the provision of a steam hammer that is capable of delivering such a

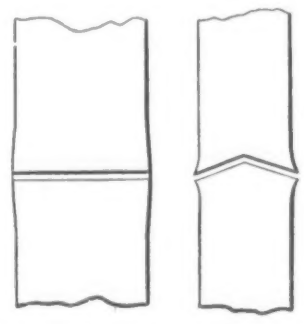

Fig. 9.—Short Scarfs for Hand Welding.

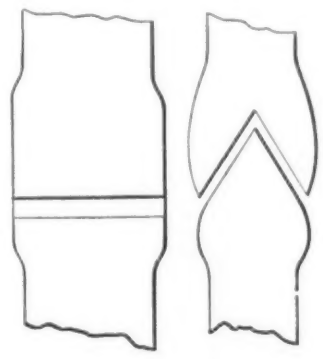

Fig. 13.—Scarfs of Frame.

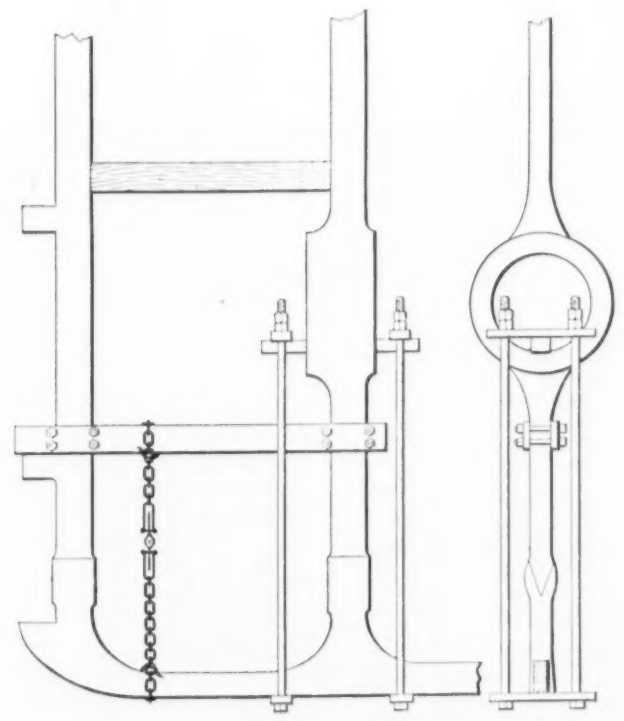

Fig. 11.—Arrangement of Screws and Tie-Rods for Welding the Keel-Piece.

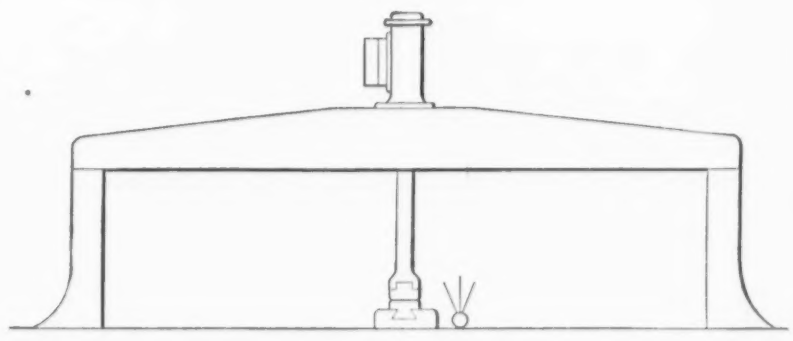

Fig. 12.—Three-Handed "Johnny" Hammer.

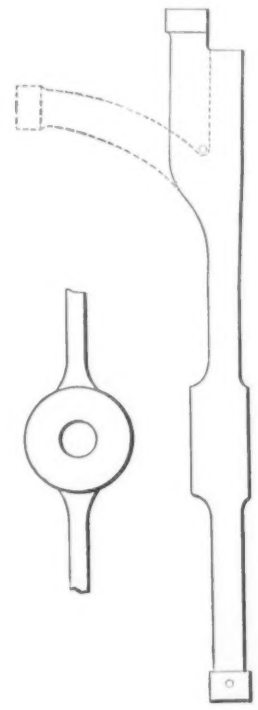

Fig. 15.—Forging Upper Part of a Large Frame with Double Posts.

There have been many attempts latterly to make stern frames of steel castings. I scarcely know, however, what success has attended those efforts. Much depends on the soundness throughout of forgings of this kind. If a ship's rudder goes wrong the vessel, cargo and all are immediately jeopardized. No money ought, therefore, to be spared in making trustworthy forgings such as these which carry the rudder. I should like to know from Mr. Putnam or his father, who is present, what results have attended the use of cast-steel frames, and whether they are likely to supersede the wrought-iron forgings. I believe that stern frames have also been made of scrap steel forgings. Some information on this point, if it can be furnished, would be interesting to us. Then, again, it occurs to one that it

THE MANIPULATION OF HEAVY FORGINGS.

pressed great satisfaction at the advance, and a series of tests on a large scale was made, under the supervision of their inspector of forgings, to ascertain how far the new process was successful. Mr. Cameron was the inspector; many of his colleagues from time to time accompanied him. His requirements were very rigid. Every weld had to be made under exactly the same conditions as a stern frame, and he insisted upon having the pieces scarfed and welded in his presence. After welding, he then had a short heat taken upon the part where the two pieces came together, and after being placed upon blocks under the hammer they were bent to an angle of 30°, and then reversed and bent back again. This severe test having failed to start the weld, he had them put into the slotting machine and cut through where the scarfs come together; in every case the welds were perfect. Not thinking at the time of reading any paper on the subject, most of these tests were relegated to the scrap heap, but two or three I have found which are here for your inspection. One of them, a piece 15 inches by 7 inches, marked D, Fig. 1, and another 12 inches by 6 inches, marked E, Fig. 4, were treated as described above. The third, F, Fig. 2, 10 inches by 7 inches, was broken cold under the hammer, requiring 11 blows from a 13-ton piston-rod, with a drop ranging from 6 feet to 9 feet, before it fractured; all showed perfect union.

Another piece, 9 inches by 5 inches, directly after welding, while still at a bright red heat, was bent alternately until the bar broke across without the weld showing the slightest sign of opening. I regret that I am not able to place this test, the most severe of all, before you, the pieces being at present in London. However, with the tests which are here, I think you will concur that with proper appliances sound welds can be made. And if by directing attention to an evil which still exists, and which has been allowed to exist too long, a better system is insisted upon by those using these forgings, the object of this paper will have been attained.

DISCUSSION.

Mr. T. Westgarth: As the matter of cast-steel stern frames have been mentioned, I might say that I have seen a frame and rudder of a 5000-ton steamer which had been made of cast steel by a leading Sheffield firm, and that the steamer is now running in the Atlantic trade. The frame, which, of course, is a very large one, is cast in two pieces and scarfed together; the rudder-post was also cast separately from the rudder and connected by an ordinary flange coupling with bolts. I have also had occasion to make tests of pieces of steel cut from

blow as is necessary in these large pieces to make a good weld, and it seems certain that the plan must be vastly superior to the older method of drawing the parts together with screws.

Mr. Charles Wood: The whole gist of the discussion comes to this, that Mr. Putnam has had the foresight to put down hammers sufficiently strong to compress the whole body of the metal together so as to get as good a weld in the core as on the outside.

Mr. F. Herbert Marshall: Will Mr. Putnam kindly say whether there is any advantage in planing or slotting the surfaces before welding? He stated that this is required in some specifications, and I presume some advantage is expected therefrom. No doubt the clean faces and accurate fitting that could be thus obtained would conduce to good welding.

Mr. J. Head: Without question the plan adopted by Mr. Putnam is a good one and in harmony with all we know of welding. might be possible to make them of one or more steel forgings, originally ingots. I would like to know if Mr. Putnam thinks it is possible to weld them together, as is done with wrought-iron forgings. Of course steel is much more difficult to weld than iron, because of the absence of cinder in it. Its very purity is here a source of difficulty, and that is one of the reasons why steel has had difficulty in competing with iron for welding purposes. At the same time that difficulty seems to be gradually disappearing. Galloway tubes are now being welded with perfect success and afterward flanged. They are better than iron ones, because, if properly annealed, when finished they will bear more knocking about cold. In boiler flues a great deal is being done in the welding of steel. At R. & W. Hawthorn's they are welding 7-foot lengths at one heat. The edges are planed into the form of a V and the flues put into the bending rolls until there is a spring on them. They are then heated by gas, and a number of men employed to beat them down. With regard to Mr. Marshall's observations I do not see myself that tooling the surfaces is at all necessary to make a good weld apart from from its convenience and greater accuracy in getting the form you want. Chemically it would not have much effect, for the tooled surfaces would become coated with a refractory scale long before they attained welding heat, and so would be on a par with surfaces finished from the hammer. In either case the use of a flux, such as silica, must be resorted to to convert the refractory scale into a fusible slag, which protects the surfaces until contact is made, and is then squeezed out.

Mr. Wm. Putnam: Mr. Head has referred to me a few questions. With regard to the question relating to steel frames, I may say that they have not been in use sufficiently long to enable us to form a reliable opinion about them. One thing is clear, more bad ones have been made than good ones. The question for shipowners and shipbuilders is, Would you like to trust steel in its present state? In the existing process we know as we are going on what we are dealing with in iron; we know whether it is sound or not. But with steel there is not a steel-maker who would make a steel casting in that way and guarantee it to be sound on the inside. With regard to steel scraps, we have made from scrap, and did not find any difficulty with it; we found it very dry, but have means of getting over that. I think the author of the paper founded his plan on a complaint that had been made as to welding with small hammers. Mr. Head expressed surprise that this ever should have taken place; it has existed too long. I have complained to the authorities, who ought to have looked after it. The matter is of the greatest importance to shipowners and shipbuilders. I notice several of Lloyd's surveyors in the room, and I should like some of them to give their experience with regard to these large forgings. As to slotting, I think it is done cheaper and better by the machine.

Mr. H. Cameron, Lloyd's Surveyor of Forgings: Several questions have been asked with reference to machining the scarfs before welding. I have tried welds made with all kinds of scarfs, and I may say that those made with machine scarfs have given the worst results. This, in my opinion, is caused by the parts being too closely fitted together, and thus preventing the surfaces intended to be welded being properly heated. The best welds I have ever seen were those scarfed as shown by the model and diagram, with plenty of space allowed for the faces to be heated, and, when properly hot, brought under a steam hammer with a sufficient power to put them together. I am very pleased with Mr. Putnam's paper as far as it goes, but I think he ought to have gone further and included engines forgings, and if this had been done I think it would have made the paper more interesting to a meeting like this, where engineers are so well represented. Besides welds that are necessary in making stern frames, there is sometimes adopted a system (when forging the bottom piece and after post of stern frame) of laying the slabs on the edge of the forgings, thus making a series of welds which is very objectionable. This is a point that ought to be considered and taken up by shipbuilders, and before a contract is given out they ought to inquire and be satisfied that they are placing their forgings where they can and will be properly made, and if this was attended to I have not the slightest doubt but we would very seldom hear about stern-frame failures through bad welds. I do not advocate Darlington as the only place where large forgings should be made. There are other places where heavy forgings can be well made, but I may say of the Darlington firm that they have stepped forward in this subject far ahead of anybody else on the northeast coast, in the shape of working experiments for the purpose of gaining information as to the best system of making and welding ship forgings. I think, however, if Mr. Putnam had shown more of the difficulties and defects in order to let buyers know what to provide against it would have been better.

Mr. T. Phillips, of Lloyd's: I should like to make a few observations in reference to a remark that all stern frames that are not constructed in the manner advocated in this paper are in a very defective condition. My own experience after several years' service as surveyor at Lloyd's Register of Shipping is that in nearly all the cases of broken forgings the damage has been traced to an extraneous cause. Of a large number of stern frames that have recently been broken I have found in every case but one that the damage has been attributable to the vessel grounding. I do not say that there were not other circumstances, but the grounding was sufficient cause to enable the shipowner to claim his insurance from the proper quarter. Owing to the peculiarities of trade, with vessels increasing in size, and therefore requiring larger and heavier stern frames, the necessity for improved forgings is becoming evident, and we ought to feel exceedingly obliged to Mr. Putnam for bringing before this meeting the method of introducing the steam hammer in the manufacture of heavy stern frames. It may be mentioned that the stern frames when constructed of iron can be repaired by rewelding, but with a cast-steel stern or rudder frame there seems to be no alternative but to make an entirely new frame, which, I think, must always be a matter of serious consideration when dealing with the question of cast-steel frames. I have no doubt many will remember the screw steamer China, lately owned by the Peninsular and Oriental Steam Navigation Co., which was broken up in the Tees at Middlesboro' about two years since. When the stern frame was taken out it was observed that the lower part had been scarfed (where the welds are usually made), and which is a plan largely adopted in the building of ships for the French navy. These scarfs, which were about 2 feet long, were perfect in fit and rivet attachment, and appeared to have been so from the time of the construction of the ship. I think that some arrangement of this kind will have to be resorted to in the future, as our ships are getting longer and heavier, and I fear

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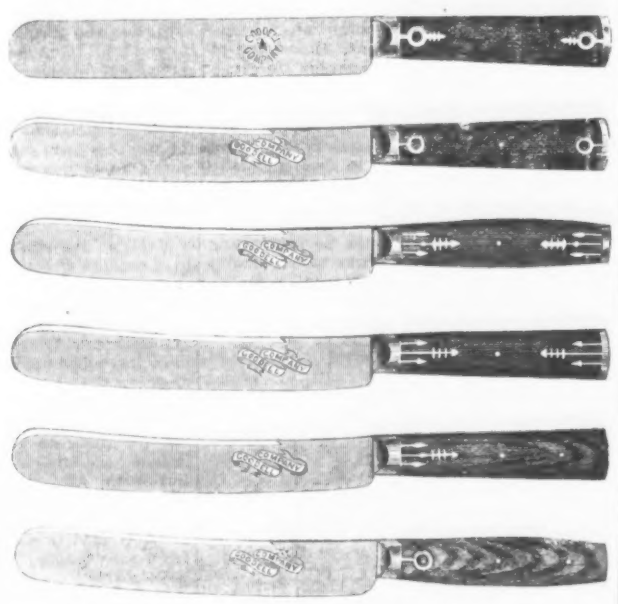

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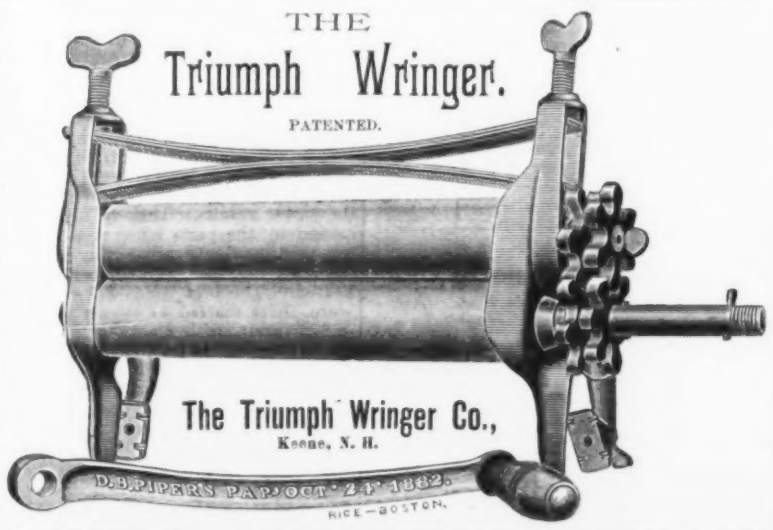

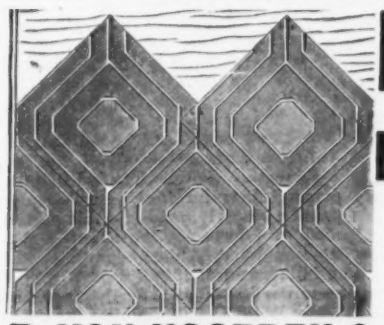

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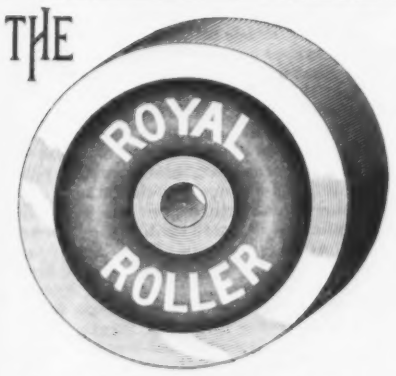

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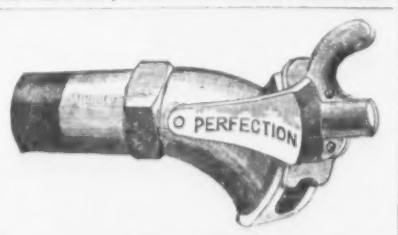

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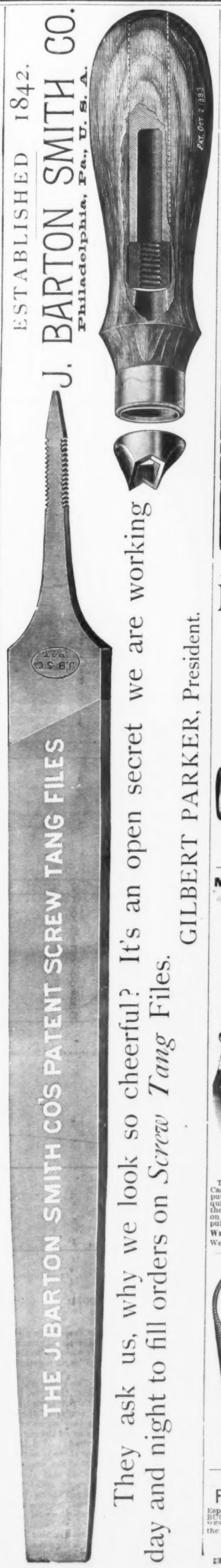

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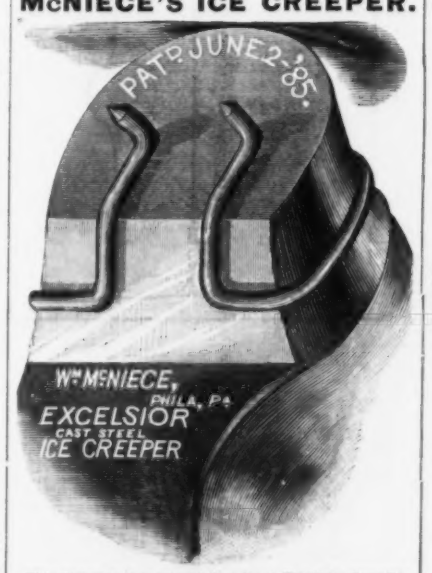

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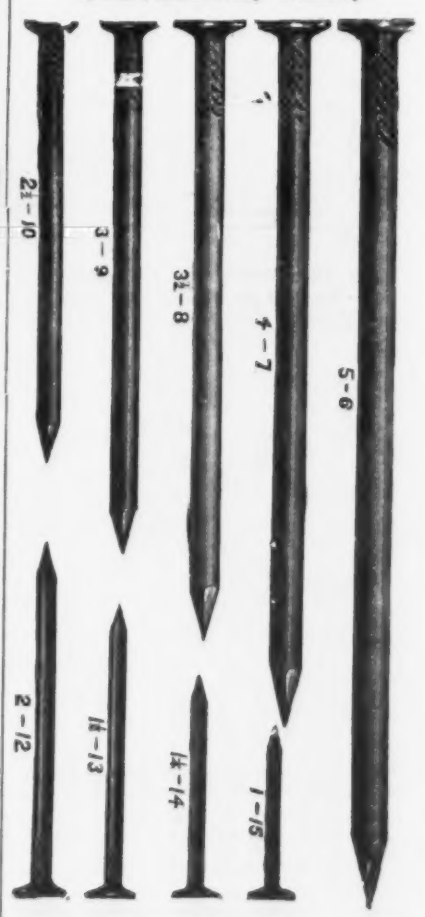

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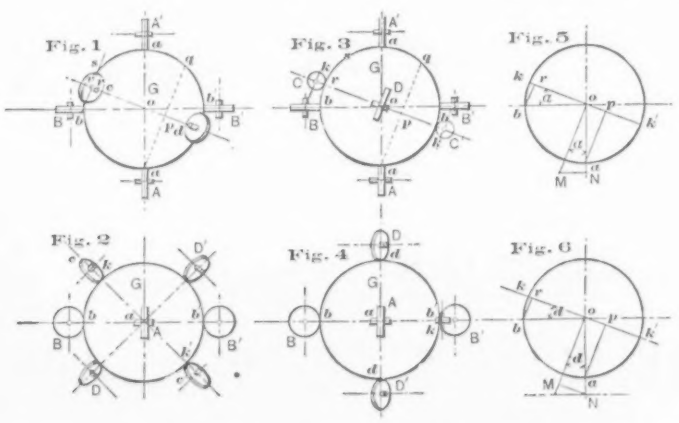
that the welding process will not be sufficient to meet the requirements of the times. With the machinery increasing in power to drive the vessel at still greater speed, vibratory motion set up at the after end of the vessel becomes a matter of serious importance to make the vessel sufficiently rigid to withstand the great strains produced by the excessive number of revolutions of the machinery. It is therefore almost a matter of absolute necessity to increase the scantlings of stern frames to insure also that the framing and plating at this part are properly riveted together, which is a difficult and nearly impossible task if the stern frame is of small siding, from which remarks it will be evident that if iron stern frames are to maintain their hold in the confidence of shipowners the perfection of welding will be expected, or without doubt the iron stern frame will have to be constructed of a series of pieces efficiently scarfed together, or cast steel frames be more largely used, after desirable improvements have been made in their manufacture. I have been exceedingly interested in the paper read by Mr. Putnam, and I think it is a good sign of the times when we find representatives of a firm such as that at Darlington showing sufficient boldness to come forward to show the public the work they are doing and to inform shipowners and shipbuilders what it is their duty to inquire into.

Mr. William Putnam: With regard to cast-steel frames, perhaps Mr. Head knows the difficulties and the loss that steel-makers have to contend with in such casting. As to scarfing, it can be done, but only in section.

MECHANICAL.

Sphere and Roller Mechanism.

Some two years ago Prof. Hele Shaw, of the University College, Liverpool, discovered certain hitherto unregarded properties of the sphere, which he published in a paper read before the Bristol Naturalists' Society. In endeavoring to give these principles a practical application he was led further in the same direction, and brought out the sphere and roller mechanism, which he described before the Royal Society on June 19, 1884, in a paper entitled "The Theory of Continuous Calculating Machines." Papers on the same subject were also read before the British Association at Montreal and at Aberdeen, giving an account of the later development of the principle. The idea was first applied to mathematical instruments, and was utilized in integrating apparatus. Several of these were to be seen in the London Inventions Exhibition. Afteward a mechanical motion based upon the same principle was designed, and after successive modifications took the form shown in the engravings. For these and for the particulars we are indebted to *Engineering*.



Sphere and Roller Mechanism.—Diagrams Explaining Principle of Mechanism.

The present mechanical device consists of two shafts in the same axial line. One shaft is driven at a uniform speed by a belt and pulley, while the other, which in the illustration is shown as furnished with a rope-drum, revolves at a speed which varies within very wide limits, at the will of the operator. The means of transmission between the two shafts is one form of the sphere and roller mechanism, the principle of which we will endeavor to render clear by aid of the diagrams, Figs. 1 to 6. If a sphere, G, be made to rotate around some imaginary axis, it is evident that its surface speed will vary from *nil* at the poles to a maximum at the equator. Further, if a roller having its axis in the same plane as the axis of the sphere be applied to the surface, it will rotate at a speed which will depend on its position between these two limits. Or conversely, if the roller be made to rotate at a uniform speed, it will drive the sphere at a speed which, measured in revolutions, will be greater the nearer the roller is situated to the pole. At that point the speed will be theoretically infinite. Now let us go a step further and imagine two rollers in contact with the sphere—one driving it and the other driven by it. It is evident that if we can vary the positions of these rollers we can obtain any relative difference of speed of motion between the two. If both be symmetrically situated in regard to the axis of the sphere, they will both rotate at the same surface speed; if the driver be nearer to the pole than the driven, the latter will have the more rapid rotation of the two, and *vice versa*.

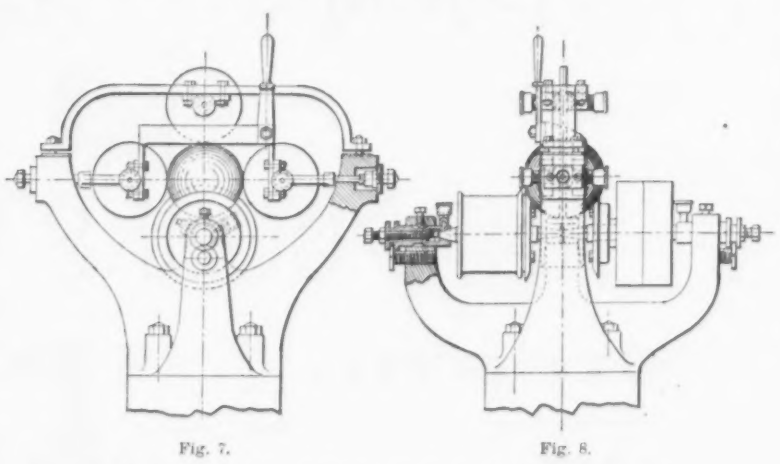


Fig. 7. Fig. 8.

Front and End Views of Hoist with Professor Shaw's Mechanism.

But it is manifestly inconvenient in a machine to vary the positions of the axes which transmit and receive the power. These are usually fixed, and the variation must take place in the parts which connect them. In this case the intermediate agent is a sphere rotating on an imaginary axis, and if the position of this axis could be changed it is evident that a different velocity ratio between the two rollers would be obtained without any alteration in their position. The means by which this result is attained forms one of the most striking characteristics of Professor Shaw's invention. If a sphere such as G, Fig. 1, be in frictional contact with four rollers, A A^1 B B^1, all mounted on axes lying in a plane passing through the center of the sphere, it may evidently rotate about any axis lying in that plane without any rubbing or grinding friction. In the two extreme positions of the axis passing through the center of A and A^1, or of B and B^1, there would be the friction of two mathematical points rotating in contact, which is, of course, *nil*. In any other position each roller would run on a circle parallel to the equator. Now, if the sphere were also in contact with four other rollers, C C^1 D D^1, likewise situated in a plane passing through the center, the same conditions would hold good with regard to these rollers. But, as the sphere can only run without rubbing friction when its instantaneous axis of rotation lies in the plane of the rollers, it follows that with two sets of rollers in different planes there is only one axis, viz., that which lies in the intersection of the two planes, which fulfills this condition. Now if one set of rollers C C^1 D D^1 be mounted in a movable frame, the axis of which passes through the center of the sphere, it follows that by moving this frame the imaginary axis of the sphere will be moved, too, as it must always lie in the intersection of the two planes. Thus, by the device of a second set of rollers capable of being moved, the axis $k\,k^1$ can be varied, the limiting positions being, first, when the axis $k\,k^1$ and $b\,b^1$ coincide, when velocity of the roller B is *nil*, and, second, when the axis $k\,k^1$ and $a\,a^1$ coincide, immediately before which the velocity of the roller B will have its extreme possible relative speed.

Figs. 3 and 4 show the arrangement first adopted. Here the four rollers A A^1 B B^1 effect the same result as in the later modification. But two of the other four are so situated that they are always on the intersections of the two great circles of the sphere, and form, in fact, rolling centers always on the equator of the sphere, while the imaginary poles of the sphere are always immediately beneath them. The rollers D D^1 form the centers of rotation of the frame, the vertical axis of the sphere passing through the points of contact. In this arrangement the range of relative motion, or velocity-ratio of the rollers A and B, or of A^1 and B^1, is limited by the fact that the roller C comes in contact with the rollers A^1 and B before it attains the theoretically extreme positions.

Figs. 5 and 6, which represent diagrammatic plans of the apparatus, show the relative motion of driver and follower for any given position of the imaginary axis of rotation. In Fig. 5, N represents the center of the roller A, and $k\,k$ the temporary axis of revolution of the sphere G; oM is a perpendicular at the center o of the sphere, meeting the axis of the roller A, produced, in M. Taking M N as a variable force, and the wheel A to be turned through the distance through which the said force overcomes a resistance, the turning of the wheel B gives the product of the said two quantities—in other words, the work done by the force. Since M N varies as the tangent of the angle through which the frame is turned, this method of affecting the required adjustment of velocity ratio may be called the tangent method. In Fig. 6 M N is perpendicular to the line O M, and the rotation of the roller B varies consequently as the value of M N and the rotation of D or D^1 (Fig. 3). Since M N varies as the sine of the angle of the inclination of the frame, this may be called the sine method of adjustment.

If we have succeeded in making clear the general idea that a sphere may be caused to rotate about any imaginary axis by the use of two sets of rollers, the reader will readily understand the construction of the hoist exhibited by Professor Shaw at the Inventions Exhibition, and which is illustrated in Figs 7 and 8. In this, for obvious mechanical reasons, the driving and driven rollers are made of conical instead of cylindrical form, as by this arrangement the corresponding shafts come in the same straight line. Upon these two cones there lies a sphere 6 inches in diameter, purposely made hollow, so as to have a very small moment of inertia; therefore, in order to provide the friction necessary for the transmission of any practicable amount of power, it is held down by the pressure of an upper roller, which is carried in an elastic frame screwed to the main structure. By tightening the nuts which hold the frame any desired pressure can be obtained. Two other rollers, carried in a swiveling frame, press on either side of the sphere, and serve to vary the axis of rotation, and consequently the relative speeds of the cones. These latter rollers correspond to D D^1 (Figs. 3 and 4)—that is, they always run on a great circle, which is the equator of the sphere. In the position shown the axis of the sphere lies horizontally, parallel to the main shaft, and the cones revolve at the same speed and in the same direction. Supposing the frame to be rotated by the handle for 90°, the axis of the sphere will be vertical, the two guiding rollers lying in a horizontal plane. Here, again, the speed of the two shafts is again equal, but in this case they revolve in opposite directions, just as if the two bevel rollers were geared together by a third. In the intermediate position, with the guiding rollers inclined at an angle of 45°, one pole of the sphere falls just below the point of contact of the driven cone, while the equator is similarly situated with regard to the other cone. In this case the conditions of speed are greatly changed; the driving roller is acting on a long radius, while the driven is at the opposite extremity of a short radius; consequently, the second shaft rotates slowly in the opposite direction to the driver. If the frame were moved into the corresponding position at the other side of the upper cross-bar, which, however, is prevented by the arrangement of the framing, the difference of speed would be in favor of the driven shaft.

It will thus be seen that, while one shaft rotates uniformly in one direction, the other may be made to run either backward or forward, at any speed between zero and a speed in excess of the driving-shaft only limited by practical conditions of friction, and that this change can be effected by merely moving a frame carrying two rollers, the effort required being no more than can be effected by one finger. It is impossible to see the machine at work without being struck by the beauty of the idea. The sphere seems to be almost endowed with intelligence, for the movement of the handle appears more like a signal of command than a mechanical operation designed to produce a change of relationship between the various parts. Further, as the eye cannot follow the direction of rotation of the burnished sphere, the senses furnish no aid in understanding why the weight suspended to the drum should first rise, then fall, then stop, and then slowly creep up to the beam, to descend again with a rush, and stop suddenly a few inches above the floor. But when we cease to regard the geometrical principles and turn to the mechanical details we find, as indeed Mr. Shaw is the first to point out, that a good deal yet remains to be done before the invention can be brought to a successful issue. Frictional gearing, except for light work, never yet came into general use, for the reason that the pressure cannot be confined to the working surfaces, but must also be spread over the bearings. Further, surfaces in contact are not the points or lines which they are theoretically assumed to be, and there is a loss from this cause. But, by good design and the best material, many of the difficulties incident to friction gearing may be much reduced, while the wonderful capability for manipulation and change exhibited by this apparatus should, in certain circumstances, counterbalance the loss of power which it may be expected to entail. Mr. Edward Shaw (brother of Prof. Hele Shaw), who designed and built the present hoist, is now constructing another for practical use.

Fig. 1.—Perspective.

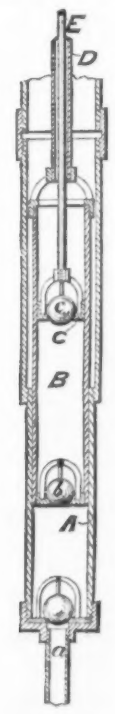


Fig. 2.—Diagram Showing Arrangement of Plunger and Piston.

BLUNT'S DEEP-WELL PUMP.

Blunt's Double-Acting Deep-Well Pump.

Those in quest of efficient and reliable pumping machinery will find some features of interest in a novel double-acting deep-well pump recently brought out by Mr. W. S. Blunt, of 100 Beekman street, New York. Our engravings represent both a general view and a diagram explaining the valve, plunger and piston arrangement. From this diagram (Fig. 2) it will be seen that the tube rod D actuates a hollow plunger, B, while the solid rod E works the piston C. Both rods are so connected with a pinion at their upper ends by means of racks, as shown in Fig. 1, that they always move in opposite directions. When the plunger B with its valve *b* moves upward the water which it contains is forced through the valve *c*, the latter with its piston C descending at the same time. When B has reached the end of its stroke and commences to return, the piston C begins to rise and thus maintains the continuous stream of water upward. Cup-leather packing is used. The whole arrangement is exceedingly simple. Power is transmitted through a crank shown in the perspective, and a driving pulley can be mounted on the shaft which is shown projecting at the right. The pump as furnished is ready for use as a powerful suction and force pump, and is also designed to be used in wells 200 feet deep or less, by extending the cylinder in the well and adding in between 4-inch pipe with the plunger-rods in equal lengths. The depth of well in which these cylinders can be worked is only limited by the tensile strength of the rods, as the entire strain is on the lifting stroke, each rod lifting alternately and going down with its own weight, thereby helping the ascending rod. In heavy-service cylinders both plungers have bronze ball-valves and four cup leathers, which, with the bronze ball seat-valve, can be pulled up through the pump at any time for repairs and again replaced.

One of these pumps having 3¼ and 4¼ inch plungers has been in use at the Elizabethport Steam Cordage Works, Elizabethport, N. J., since June 1, 1885, and has thus far proved highly satisfactory in every way. The pumps are now made in eight sizes, with cylinders ranging from 2¼ to 5¼ inches in diameter, and the quantity of water pumped per hour at 30 strokes per minute varies from 1782 to 13,456 gallons.

Chimney Temperatures and Air Supply.

Under the above head *The Mechanical World* of recent date directs attention to the popular fallacy that a reduced temperature in a chimney necessarily implies a corresponding economy in fuel. The heat of the gases rejected from a boiler furnace, it explains, may be reduced in several ways. First a reduction may occur from the use of an unnecessary amount of air for the purposes of combustion. Rankine states that the minimum quantity allowable is 12 pounds of air to each pound of coal, but that in consequence of the difficulties attendant on thorough admixture of the air with the combustible gases it is not generally possible to use less than double the above amount of air, or 24 pounds. The effect of this, assuming that the temperature is the same, is simply that in place of passing out 13 pounds of smoke and gases at the chimney top we actually throw away 25 pounds. As an approximate calculation, if we assume the furnace temperature to be 2000° and we reject the smoke at 500°, there is a utilization of 75 per cent. only of the heat. If we then make it possible to use only 12 pounds of air, or the theoretic minimum, it is clear that, even if the above initial and final temperatures hold good, the total rejected weight will be $\frac{1}{2}\frac{3}{5}$ only of the previous amount, so that of the formerly rejected heat there has been saved $\frac{1}{2}\frac{3}{5}$ of the wasted 25 per cent., and the actually utilized heat is raised to a percentage of 87, which is an increase of furnace efficiency of 16 per cent. By a reduction in the quantity of air employed there are, however, other means of securing further economy, for, the bulk of produced gases being almost halved in quantity, their rate of travel along the tubes and flues of a boiler will be reduced correspondingly, with the result that more time is allowed for them to part with their heat to the boiler, so as to enable the final temperature to be also reduced. With the same chimney this final temperature would still be efficient as a draft producer, and if it was found possible to bring it down to 400° a saving of a fifth of the waste of 13 per cent. (to which already we have reduced it) would be effected, so that a practical efficiency of 90 per cent. would be attained, or an increase of 20 per cent. on the original duty.

It is thus easy to see how important it is to reduce air supplies to as near a minimum as possible, avoiding needless bulk of gases and dilution of the heat, for every pound of air introduced carries off with it at the final temperature heat which would otherwise have been absorbed. Generally speaking, it may be said that the efficiency of a steam boiler as measured by the water evaporated is measured by a number between 0.5 and 0.7, but there appears no reason why higher factors should not be attained. The means at present employed for utilizing the heat of burnt fuel are far from being so imperfect as many would appear to believe. The chief cause of low efficiency lies in the combustion of fuel. It is clear to the majority of thinking men who have studied the subject that it is not scientifically a wise proceeding to burn fuel in immediate contact with the intended heat-absorbing surfaces, as is now done in steam boilers. Many ways of obtaining increased efficiency have been proposed. The heating of the air supply has been strenuously urged, and as severerly condemned as folly. How it can be condemned is somewhat difficult to understand. It is easy to understand that so far it may not have been successful, but it cannot be wrong in principle to supply air already heated to several hundred degrees of temperature when it is so well known that even if not heated it will be in the very body of the fuel itself raised to perhaps fully 2000°. Hence preheating deserves attention, and it may be urged that if the hot blast is productive of economy in the working of blast furnaces, and if the regenerative system is so efficient when applied to gas-retort benches, it must easily admit of further useful application.

It is, however, readily comprehended that with a final temperature of perhaps 600° only there is not the field for the application of the regenerative system to steam-boiler furnaces that there is to gas-retort furnaces, where the final heat must be at least sufficient before entering the regenerator to keep a retort to a bright red heat. This is a point overlooked somewhat by the advocates of regenerative steam-boiler furnaces. It should not be understood, however, that even here the system would not be economically applicable, and, as there yet remains a possibility of saving part of what is usually a loss of 0.3 to 0.5 of the fuel in the boiler department alone, the subject is still a wide one and worthy of thought.

A New English Speed Indicator.

At the recent International Inventions Exhibition a firm of English engineers, Messrs. Goolden & Trotter of London, exhibited an ingenious little device known as the Blythswood Speed Indicator. Its object is to indicate the speed of the screw propeller of ships, and at the same time to keep a permanent record or speed log on paper for future reference or comparison. The importance of the object to be attained is generally recognized, as in cases of collision, in which it is often of vital importance in the inquiry held, to know the speed of the engines, and whether they are going ahead or astern. In such cases the evidence of an unbiased witness, such as the automatic speed log above referred to, would be conclusive and unanswerable. The mechanical principle on which the working of the instrument is based is that the variable angular velocity w of a body, A, can be compared with the constant angular velocity w^1 of another body, B, if a point on B at a distance r^1 from its axis of rotation has the same linear velocity as a point on the circumference of A. We then get $w = \frac{w^1}{r}\,r^1$, in which $\frac{w^1}{r}$ is constant, and thus w varies as r^1. The condition is evidently satisfied by a disk pressing on the surface of a cone revolving at a uniform speed, for the linear velocity of the point in the perimeter of the disk which is in contact with the cone, being identical with that of the corresponding point of the cone, will be proportional to the radius of the corresponding circular section of the cone, and consequently to the distance of the point of contact to the apex of the cone. If, further, the disk forms the nut of a screw rotating in the opposite direction to the cone, and the axis of the screw is placed parallel to the side of the cone, it is obvious that the nut and screw must have the same angular velocity for the nut to be at rest on the screw, and the disk will therefore take up a different position on the screw as the velocity of the latter changes.

In the instrument shown at the Exhibition the screw was driven by the shaft whose speed was to be indicated, while the cone had a constant speed communicated to it by clockwork. The nut traveled over a scale showing its speed in the various positions, and by a series of electric contact pieces attached to a cable the indications can be repeated as many times as is necessary on dials placed at any distance from the machine. When the engines reversed, a

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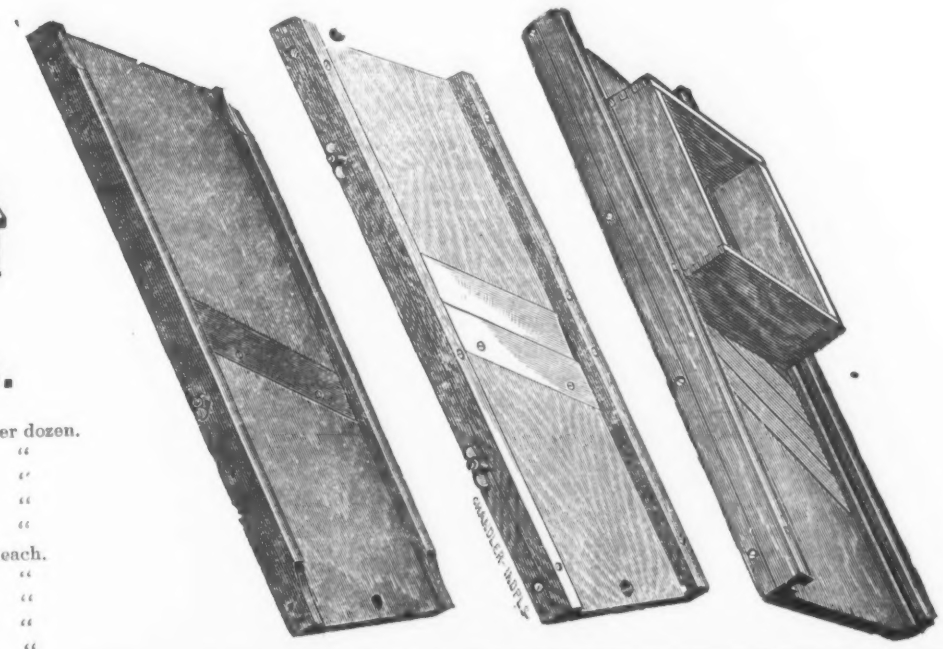

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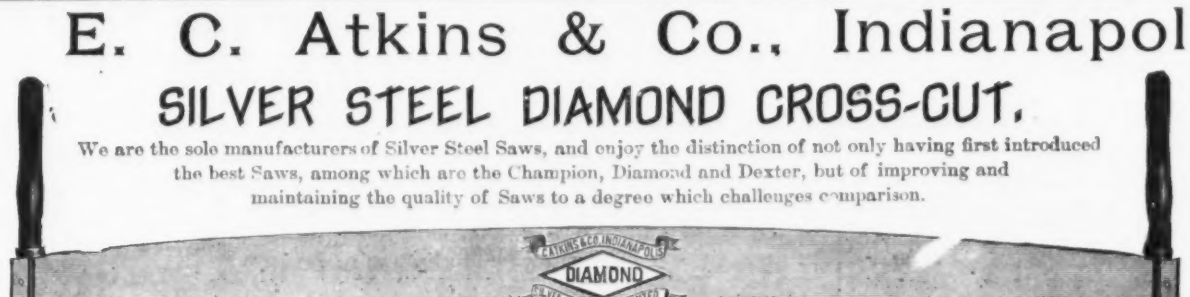

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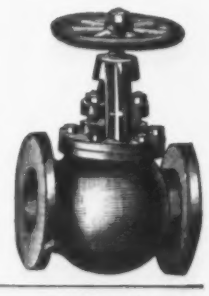

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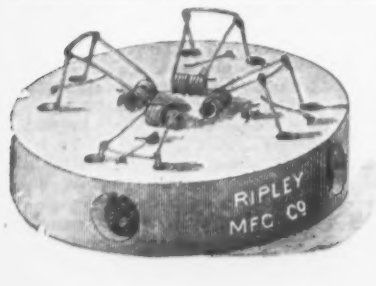

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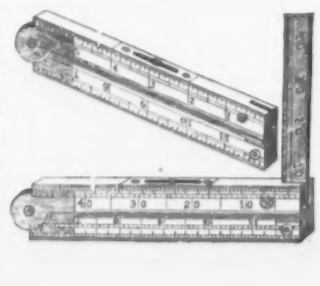

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clutch kept the screw revolving always in the same direction, and at the same time pulled over a switch placed in the electric circuit, so that the dials showed not only the speed, but also the direction ahead or astern. The clock driving the cone was wound periodically by the revolving shaft whose speed was being indicated, being thrown automatically in and out of gear by an ingenious device which prevented the clock from being either overwound or running down too far. The speed log was traced by a pencil carried by the nut already mentioned on a drum which revolved once in 24 hours by independent clockwork, the paper being renewed every day.

The Friction of Belts.

The friction of belts upon pulleys depends upon the extent to which they are tightened, the extent of circumference with which they are in contact, and their breadth. It is commonly believed that the greater the diameter of the pulley the more surely does the belt cause it to revolve without slipping. Theoretically, however, and, we believe, practically, says a writer in the "Circle of the Sciences," it will be found that, with equal degrees of tightness, equal breadth of belt and equal circumstances as to perfection of contact, the friction of a belt on the circumference of a pulley is the same, whatever be its diameter. The only circumstance that can affect the constancy of the result is that the belts, not being perfectly flexible, lie more closely to surfaces curved to a large radius than to those of smaller radius. It is found, practically, that a leather belt 8 inches wide, embracing half the circumference of a smoothly-turned iron pulley, and traveling at the rate of 100 feet per minute, can communicate 1 horse-power. When less than half the circumference of the pulley is embraced the strap must be proportionately wider, and when more than half the circumference is embraced its width may be less. The law according to which the friction of a belt increases with an increased arc of contact is of a peculiar character, but may be readily understood by comparing the friction on arcs of different lengths.

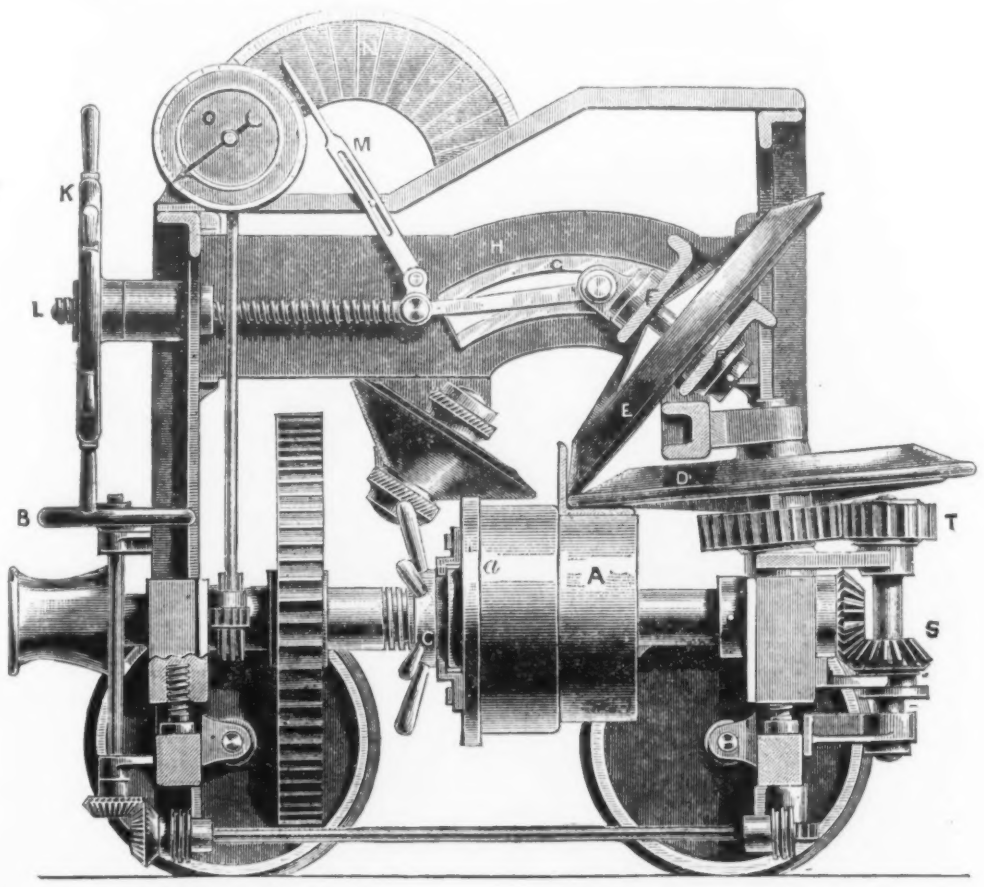
If a pulley (of any diameter whatever) were prevented from revolving, and a belt passing over part of its circumference were stretched by a certain weight at each end, addition might be made to the weight at one end until the belt began to slip over the pulley. The ratio which the weight so increased might bear to the weight at the other end would measure the amount of friction. For example, in experiments made to test a theoretical investigation on the subject, a belt passing over a pulley in contact with 60° of its circumference was stretched by a weight of 10 pounds at each end; one of the weights was increased until it amounted to 16 pounds, when the belt began to slip. The ratio of 16 to 10, or 16 divided by 10, equals 1.6, was then the measure of the friction. When 20 pounds at each end were used to stretch the belt, the one weight was increased to 32 pounds, giving the ratio of 32 divided by 20 equals 1.6, the same as before; and likewise, when 5 pounds were used for stretching, the weight at one end was increased to 8 pounds, giving still the same ratio, 8 divided by 5 equals 1.6. So far, then, the friction was precisely proportional to the stretching weight, as might have been expected from the ordinarily received doctrine on the subject of friction. On extending the arc of contact to 120° the ratio was found to be 2.56, or 1.6^2. And, again, on embracing 180° the ratio was found to be 4.1, or very nearly 1.6^3. The theoretical investigation brought out this result independently, and the following law may therefore be taken as established: If for any given arc of contact the one weight bears to the other at the point of slipping a certain ratio for double the arc, the ratio will be squared; for triple the arc, it will be cubed; for four times the arc, it will be raised to the fourth power, and so on. In all cases, however, much depends on the tightness of the belt, the limits to the force with which it strained being, first, the tensile strength of the belt itself; and, secondly, the amount of pressure that it may be convenient to throw upon the shaft and its bearings. New belts become extended by use, and it is therefore frequently necessary to shorten them. Before use they should be strained for some time by weights suspended from them, so as to leave less room for extension while in use. Wherever belts are employed they should be of the greatest breadth and travel at the greatest speed consistent with convenience, as it is most important to have the requisite strength in the form best suited to flexure, and the least possible strain on the shafts and bearings.

Transmission of Power by Rarefied Air.

Concerning the transmission of power by rarefied air, to which we have repeatedly had occasion to direct attention, it is interesting to note that in Paris, where the system has been practically applied, a vacuum of 75 per cent. is maintained in the pipes. These communicate with the apartments to be supplied with power, and are connected to the domestic motor. Motion is thus derived by the pressure of the external air, and the consumption of power is determined by a meter. The exhausting engine is of 70 horse-power, having one cylinder, horizontal, and connected direct to the exhausting cylinder, by which air is extracted from the vacuum-pipes. The engine makes 60 revolutions per minute, the air cylinder cutting off rarefied air at one-fourth, and expelling it at atmospheric pressure. The air cylinder is prevented from heating by cold water injected into it. It is 40 inches in diameter with a stroke of about 40 inches, calculated for the distribution of from 35 to 40 horse-power to houses. The system of vacuum-pipes is laid in the sewers. The pipes vary from 10 inches in diameter near the central establishment to 8 inches, and thence to 6 inches. The branch or service pipes are of lead. The total loss of head is not more than 3 or 4 per cent. The pipes are exhausted of air, so as to cause a vacuum during eight hours a day—occasionally, 12 hours in the day. Motors of 1 horse-power, ½ horse-power or ⅓ horse power would conveniently drive a dynamo-electro machine for from three to six or ten lamps. The company supply power for driving lathes for various purposes, rolls, drills, planing machines, sewing machines, circular saws, band saws, ventilators and many other machines. The charge for power for working a sewing machine amounts to 17 cents per day of 10 hours

New Beveling Machine.

The ordinary method of beveling angle-irons for shipbuilding purposes, besides being costly and unsatisfactory, is also liable to injure the metal. In beveling a bar according to the usual practice, the angle has, in the first instance, to be guessed at by the workman; then altered back or forward until it conforms with the bevel obtained from the body plan of the ship. It follows that the best heat has gone from the iron or steel bar before this can be done, and when the bevel is extreme the bar, before being finished, has to be heated, in some cases three or four times. It is drawn and disfigured by hammering, and the holes in the beveling slabs are imprinted on the outside surface, and when the riveters attempt to close up the work with the aid of quarter hammers they not unfrequently finish by breaking or fracturing it. With the view of obviating these evils, the beveling machine which we illustrate on this page has been designed. According to the *Revue Industrielle*, from which we reproduce the engraving, this machine is now being extensively introduced into France and is in successful operation in several of the largest shipbuilding yards in England. It is known as Arthur's beveling machine, and is built by the English firm, Messrs. Davis & Primrose, of Leith.



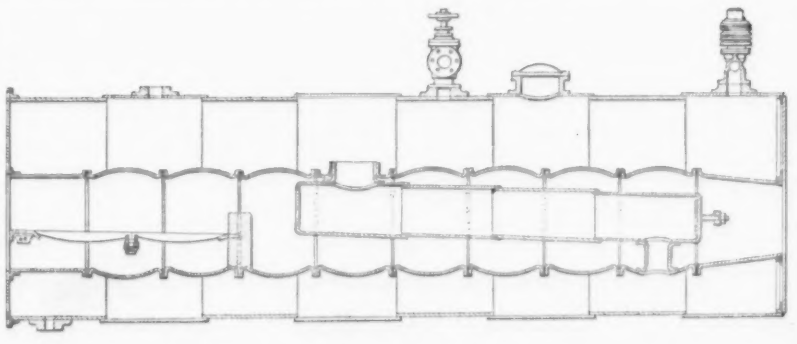
NEW BEVELING MACHINE, BUILT BY MESSRS. DAVIS & PRIMROSE, LEITH, SCOTLAND.

The machine is mounted on rails in front of the furnace, and when it is required to be used it is brought up opposite the furnace-mouth. It draws the bar out of the furnace, does the beveling when the bar is at its best heat, bevels straight out from the heel and smooths down the rough edges of the rives-holes, so that the rivet-head gets close up at neck and the work lays close. It does the beveling correctly and at once, producing smooth, clean and accurate work, and, the operation being done by roller when it is hot, the edges of the bar are fair and free from local strains. The time occupied by beveling being so short the bar, when it has left the machine, is sufficiently hot to be turned without reheating. It also winds or turns fair to the set, and is therefore free from kinks. For frames and other work to be done by the machine the bevels are taken from the body plan of the ship at regular intervals along the bar and the spots numbered, as usual, and the angle at each number or spot is measured, and the numbers transferred to the corresponding angles on the bevel-board. On the machine is what is termed the "bevel-plate," which is graduated into degrees from 90° to 45°. The angles which have been marked on the bevel-board are then indicated by their numbers on the bevel-plate of the machine in their relative positions, measuring from the end of the bar.

Our engraving represents the machine with part of the gearing and guide rollers removed. On the main shaft is the roller A, which is adjusted vertically by the hand-wheel B, and horizontally by the nut C, to suit the thickness of the bar. D is a conical roller driven at the same relative speed as A. The horizontal flange of angle is caught, kept level by and fed through the machine between the rollers A and D. E is the beveling roller attached to a beam, F, the ends of which move in quadrants G in the framing H. The roller E can be brought over to any angle by the hand-wheel K and screw L. The pointer M being attached to the screw L at once indicates on the bevel-plate N the angle which is being given to the bar. O is a dial worked from the main shaft by a worm-wheel, and shows the travel of the bar through the machine. What remains for the man in charge is to bring over the beveling roller to the angle shown on the bevel-plate. The bar shown is represented in the position for open beveling. When it is required to shut-bevel the bar, it is fed through the machine with the horizontal flange in the opposite direction to that shown in drawing, so that the edge will lie towards the collar *a* of the roller A, and this roller is then adjusted horizontally to bear upon the edge of the bar.

Arnold's Steam Boiler.

The boiler shown in the annexed engraving is an English invention, having been designed by Mr. William Arnold, of the Victoria Boiler and Iron Works, Barnsley, England. The furnace flue is formed of lunes or barrel-shaped sections, which from their configuration are capable of successfully resisting a large compressive strain. These are constructed out of welded cylindrical tubes, bellied and flanged at each end, the entire manufacture being performed by machinery. As shown in the illustration, a ring is interposed at the junction of each pair of sections, but this arrangement is not always followed, the sections being often riveted directly together. The whole forms a capital furnace. Immediately behind the bridge is fixed a water-tube, connected at one end to the water above the furnace, and at the other end with the water below. The tube stands in the fairway of the flame and gases, which spread over its entire surface, passing along it from end to end. Messrs. Arnold & Co., who build this form of boiler, also apply the special construction of furnaces to boilers not fitted with this water tube.



ARNOLD'S STEAM BOILER.

Wire Belts for Stone-Cutting.

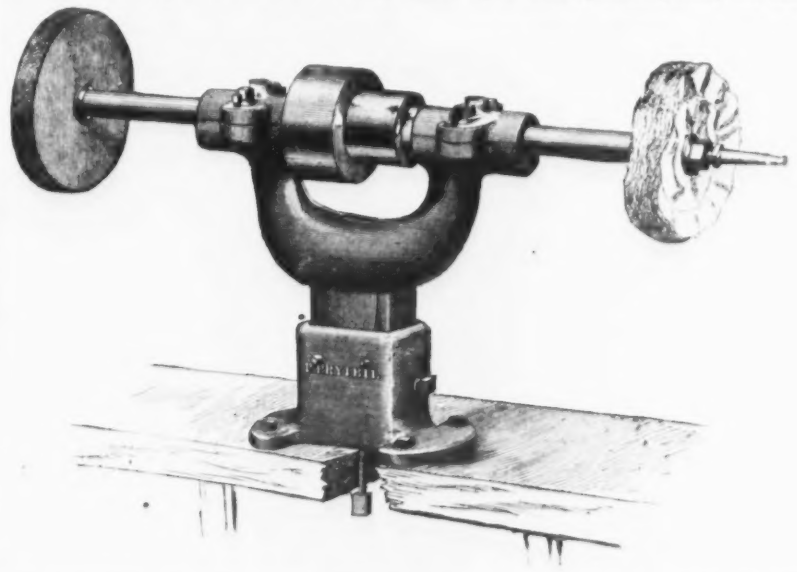
The principle of continuous motion used in the belt saw for wood has been applied to stone-cutting. Instead of a flat metal band, three steel wires twisted together and run at a very high speed form the cutting surface. Water and sand are applied in the manner usual with the ordinary flat saws for stone. According to *Engineering*, from which we take the above, it is claimed that such saws advance in marble at from 10 to 24 inches per hour, depending upon the hardness of the stone. It is also used for quarrying purposes in dividing up masses of stone which project between recesses in the quarry.

The Hardy High-Speed Engine.

A new horizontal engine for which special advantages as an efficient high-speed motor are claimed is now being turned out by the Illinois High-Speed Engine Co., 161 La Salle street, Chicago, Ill. The engine is of the single acting double-cylinder type, the shaft being placed between the cylinders. The two pistons are connected to the same crank, thus producing a push on the latter during both strokes. As a consequence the boxes are kept in contact with one another, and the work is done by push in one direction instead of by push and pull, as in the ordinary way. The cylinder and frame are all cast in a single piece, the metal being so distributed as to secure perfect rigidity without excessive weight. This construction also secures accurate and permanent alignment. The shaft and connections are of steel. The piston-heads have long bearing surfaces, being over three times the ordinary length. The steam ports are short, direct and large sized, being one-eighth the area of the piston. The valve is of the trunk-piston pattern, accurately steam-balanced, and operates with a minimum of friction. These valves also have an exceptionally long bearing, equal to that of the cylinder minus the stroke of the valve. A packing ring is provided at each end of these valves, and because of their excessive length their durability, it is claimed, is unusually great. The valves serve a double purpose, being primarily used to admit live steam to the cylinder, and, secondarily, to open a supplemental exhaust. This construction is devised for the purpose of properly controlling the lead and compression. The exhaust port is opened by the direct action of the piston at the terminus of the stroke, and not through the intervention of an eccentric. It is large, and so arranged as to secure excellent results. The space occupied by an engine of this pattern of 50-horse-power is 6 feet long in the direction of the shaft, 5 feet over all in the direction of the cylinders, and 3 feet high from the base to the bottom flange of the governor.

New Buffing Machine.

Among the new tools recently brought out by P. Pryibil, corner Tenth avenue and West Fortieth street, New York City, is the buffing machine shown in the accompanying illustration. This machine is arranged to carry two wheels besides the one which may be placed on the tapered screw. The spindle is of steel, running in adjustable, babbeted, self-oiling bearings, and is provided with a cone pulley with two steps for varying the speed. Tight and loose pulleys are substituted when so ordered. The hight of the spindle is variable. This enables the stretch of the belt to be taken up. The adjustment is accomplished by loosening the set-screw at the side of the base-plate and operating the screw which projects from the bottom through the bench. The whole length of spindle is 43 inches. The distance between the two main wheels is 34 inches. The hight to the center of spindle is 14½ to 16½ inches, according to adjustment. The machine is calculated for 2200 to 2700 revolutions per minute.



NEW BUFFING MACHINE MANUFACTURED BY P. PRYIBIL, NEW YORK.

Cleaning Up Machinery.

In cleaning up a piece of machinery to keep it in the best working order, some attention should be given to those parts which are out of sight, that generally have the most of the work to do, as well as to be continually shining up the finished work to satisfy the general appearance. Superficial cleaning is all very well as far as it goes, provided that the dirt and dust which settle and collects on the machine are not wiped out in every corner, and all the spacings between the wearing surface filled with the polishing powder from the wiping waste. Many of the vital parts of a machine have had to be removed long before the general overhauling that is instituted to look after the condition of things that are not benefited from any superficial treatment. No machine can be kept up to the highest speed or left at its greatest working capacity if all the parts where the greatest strains are brought, or the bearings that have the most of the load to carry, are to be neglected. Among machines of the same class the difference in production is often owing as much to the lubrication and the oil that is used, together with its treatment, as with the builders of the machinery. The success in the free use of oil, or where the lubricant, however cheap, is thrown all over the machine, is owing more to the continued bathing—that is, washing out the very collection of the gritty, grinding products that have been working into the machine. A mixture of cheap oil with a little of the very best, must bring a cheap journal in contact with a large amount of decent lubrication where such a circulation is kept up, though it may not be enough to neutralize the effect of the waste matter the cheap oil may contain. No doubt, where drainage is good, or the drip from the machinery can be easily disposed of, that the slushing method, without regard to general appearance, has proved more beneficial to the life of a machine where the highest speed is to be maintained, but certainly, as a rule, the proper cleaning of machinery has not received that care or attention, nor is it provided with the requisite means of lubrication which sincere regard for economy demands.

Work Done in Hand-Boring.

Prof. Hans Höfer, during his residence in Pribram, Bohemia, was engaged in some experiments with a view to determine the mechanical effort required in boring holes for blasting in rock by hand, but in consequence of his removal to Leoben they have not been completed. The chief point of interest consisted in the determination of the work done by the use of a specially-contrived indicator. This consisted of a spiral buffer-spring with a socketed plug in the position of the buffer-plate. A bar representing the borer is placed in the socket and struck with the sledge or mallet at the other end in the same way as in actual boring. The compression of the spring due to the blow is measured by a system of levers carrying a pencil which marks the distance moved upon a drum covered with paper, the whole of this part of the apparatus being similar to that of a Richard indicator. The scale of the diagram is made by dropping weights of different sizes from a hight of 1 m. on to the top of the buffer-rod, when a line corresponding in length is drawn upon the paper. The whole apparatus is fixed to a wooden board which can be fixed by screws in any required position, upright, inclined or inverted.

The result of the experiments, as far as they have yet gone, show that the work done by a miner of average strength and skill, using a sledge of about 5.3 pounds weight, is about 30.5 foot-pounds per blow, or 45.25 foot-pounds per second. This supposes the direction of the bore-hole to be in the most favorable position, namely, vertically downward. For other positions the results are as follows:

	Downward.			Upward.		
Inclination.....	90°	60°	30°	0°	15°	30°
Comparative duty per cent.....	100	76.1	61.6	49.7	37.6	32.2

A comparison of these figures with those obtained from the use of hand-power boring machines working percussively shows the latter to be mechanically disadvantageous, as the duty realized in the most favorable positions is but very little more (about 46 foot-pounds per second) than that of hand labor, and at an average inclination of 40° is actually less, being only about 30 foot-pounds, even when making allowance for the time taken up in shifting and adjusting the machine. A series of experiments made in the mines showed that the work done per ½ inch of hole about 1 inch in diameter, bored in fine-grained crystalline schist (*grauwacke*), at Pribram, was about 1840 foot-pounds, while in a specially hard variety of the same rock it was 3640 foot-pounds.

The most recent official appointments include John Bigelow, of New York, Assistant Treasurer of the United States at New York, to succeed Mr. Acton, and Wm. D. Robinson, of New York, to be Supervising Inspector of Steam Vessels for the Ninth District.

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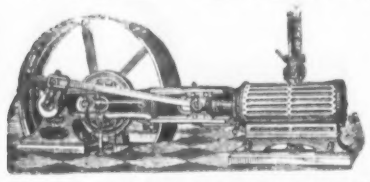

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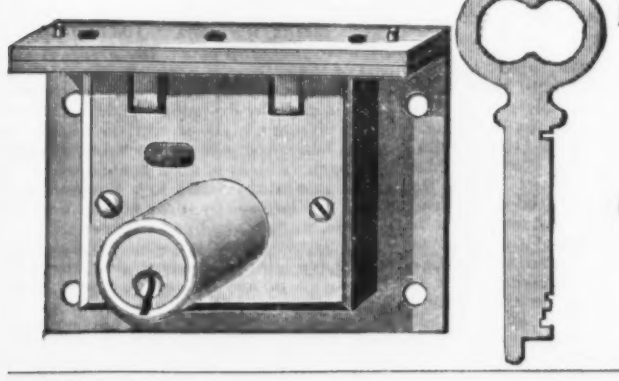

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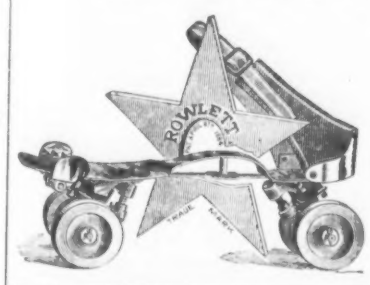

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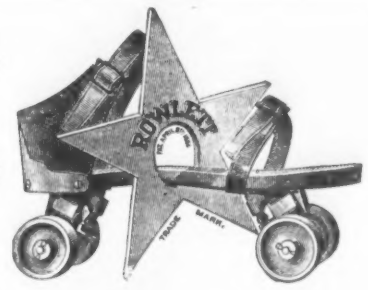

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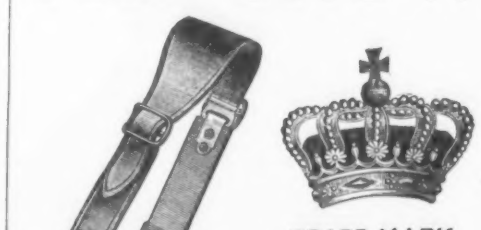

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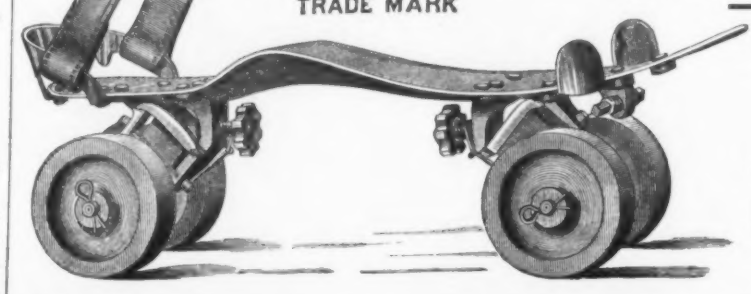

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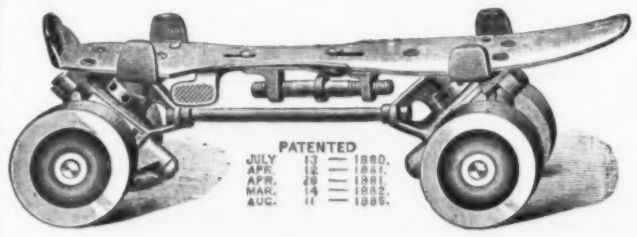

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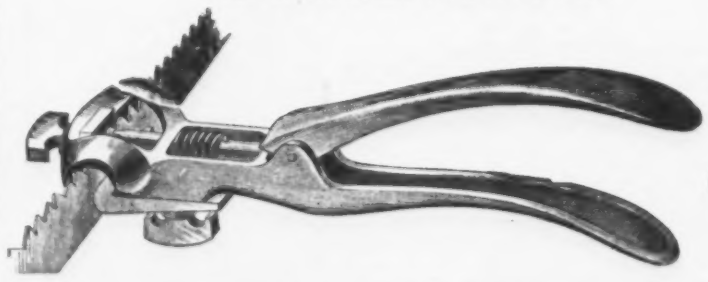

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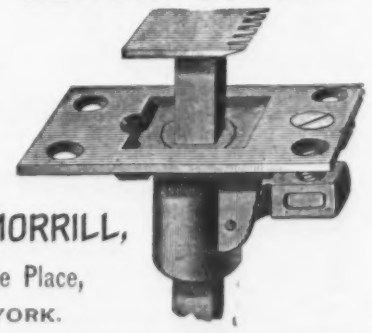

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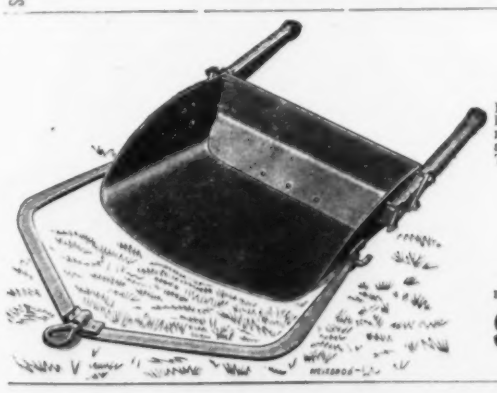

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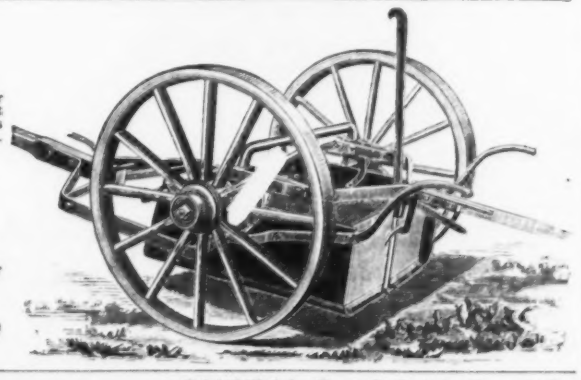

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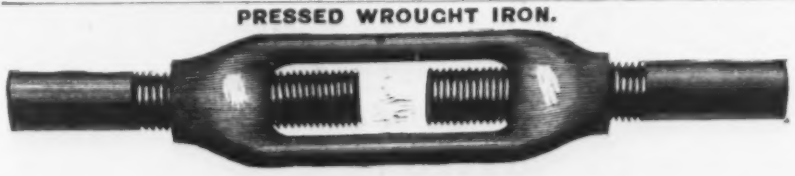

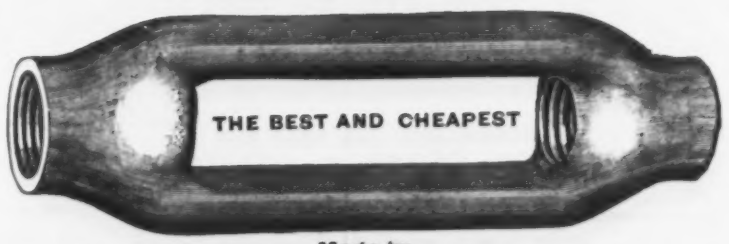

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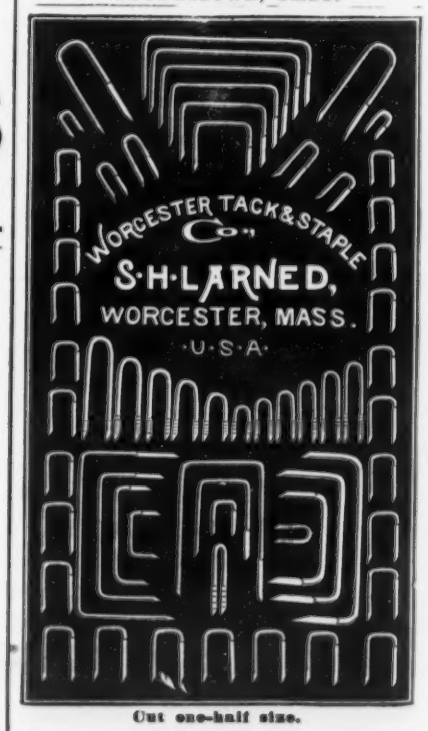

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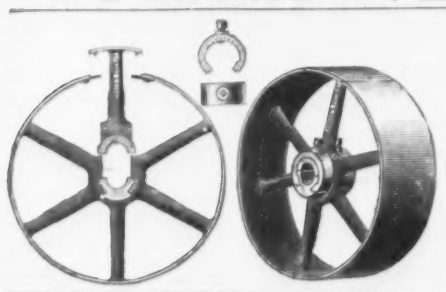

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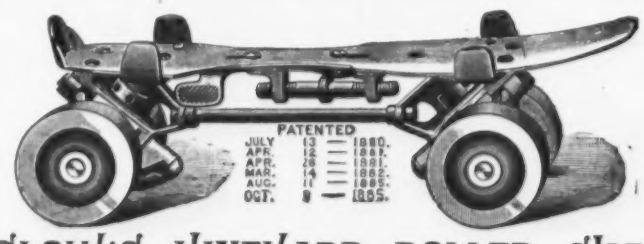

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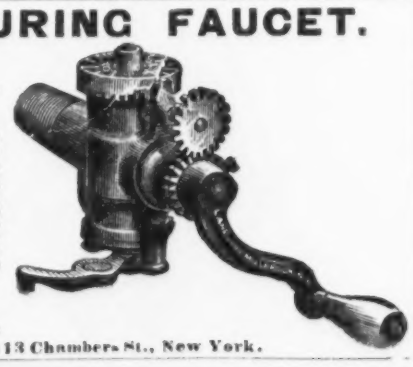
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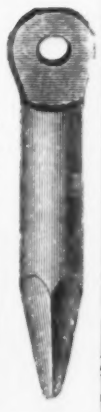
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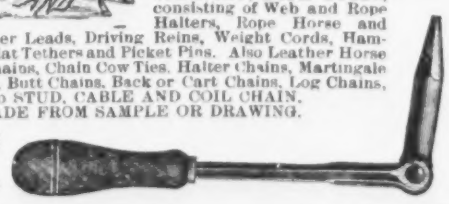

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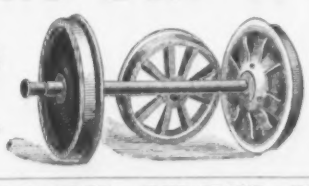
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Notes of Novelties.—This is a department of the journal always watched with interest by the trade, as it contains an account, from week to week, of the novelties which manufacturers and inventors are introducing to the notice of the trade. These articles are freely illustrated.
Special Correspondents.—The *Ironmonger* has a deserved reputation for its special correspondence from all the principal Continental, British and manufacturing centers. The writers are gentlemen holding important positions in the districts with which they are connected, and possess facilities for acquiring information specially suited for the columns of the *Ironmonger*. ***The Week, Legal News, Trade Notes, Bankruptcies, Foreign Notes, Colonial Jottings, Merchants' Circulars, &c.***, are each departments of the journal containing a digest of all matters of direct interest to the Iron, Hardware and Metal Trades. In addition to the above, there is a carefully classified list of Patents, together with Editorial Notes, French, Belgian and other Special Correspondence.

SUBSCRIPTIONS
to the *Ironmonger and Metal Trades' Advertiser*, with which is sent every fourth week the Foreign Supplement (see below), may commence from any date, but are not received for less than a year complete. The rate is $5 per annum, inclusive of postage to any part of the world outside Great Britain. To every subscriber is presented, free, in the course of his year, a handsome and useful ***Ironmongers' Diary and Text Book,*** a work sold to non-subscribers at 75 cents.
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This is an annual, presented free to every Subscriber to the IRONMONGER AND METAL TRADES' ADVERTISER It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to year. It is handsomely bound in cloth, gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of exceptional value for advertisements. Sold to on-subscribers at 75 cents.

THE FOREIGN SUPPLEMENT,
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NOVEMBER 28, DECEMBER 26, 1885, JANUARY 23, FEBRUARY 20, MARCH 20, APRIL 17, MAY 15, JUNE 12, JULY 10, AUGUST 7, SEPTEMBER 4, OCTOBER 2, OCTOBER 30 and NOVEMBER 27, 1886. This supplement is published in
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of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only within reach, but in the native language of eighty millions of *German*, twenty-eight millions of *Italian*, and fifty-one millions of *Spanish* speaking people; or in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.
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THE WHOLE FOREIGN HARDWARE TRADE,
so far as our experience of more than twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertisement inserted in the *Ironmonger* and FOREIGN SUPPLEMENT is a strikingly powerful and most efficient way of publicity, not to be compared with any of the other ordinary channels of communication.

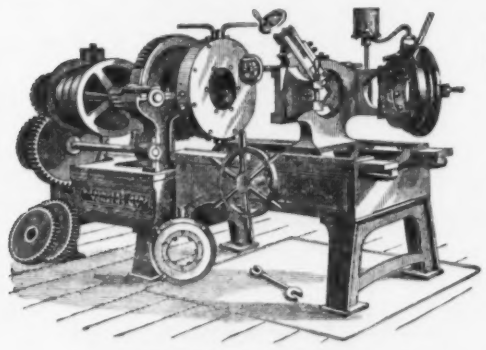
WELDED CHROME STEEL & IRON (5 PLY) FOR SAFES VAULTS &C.
CHROME STEEL WORK'S BROOKLYN. E.D.N.Y.
CHROME CAST STEEL FOR EVERY PURPOSE
CHROME CAST STEEL FOR MAKING TOOLS
COMBINING A MAXIMUM OF TENSILE STRENGTH AND DUCTILITY WARRANTED
CHROME CAST STEEL FOR ROCK DRILLS TAPS DIES &C
CHROME STEEL & IRON FOR JAIL BARS
PERFECT WELD

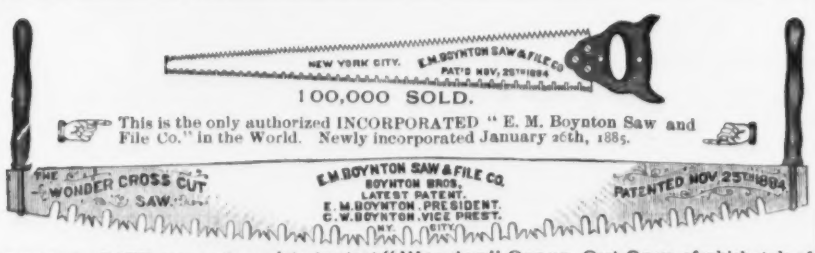
LIESCHE'S
Burglar-Proof Sash Lock
AND
Automatic Window Holder.
Cheapest, Strongest and Only Practical Automatic Lock and Holder on the Market.
SAMPLES FREE TO THE TRADE.
J. R. CLANCY, Syracuse, N. Y.

JAMES HILL,
MANUFACTURER OF

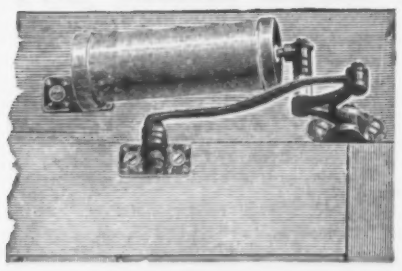
GALVANIZED BUCKETS,
AND
ASH CANS
A Specialty.
Providence R.I. P. O. Box 770.

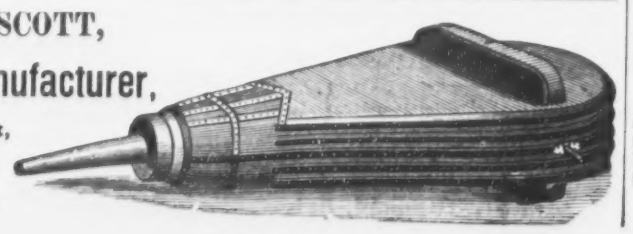
PEUGEOT FRÈRES,
MANUFACTURERS OF
Finest Grades of Steel
FOR WATCH, CLOCK AND OTHER SPRINGS.
Band Steel for Saws for Metal and Wood. Steel for all Mechanical Uses. The "Lion" Brand of Band Saws Best and Cheapest Made.
Correspondence Solicited.
McCOY & SANDERS,
AGENTS FOR UNITED STATES AND CANADA
26 WARREN STREET, NEW YORK.

D. SAUNDERS' SONS,

MANUFACTURERS OF
Pipe Cutting and Threading Machines
For Pipe, Mill and Steam Fitters' Use.
Tapping Machines
For Steam Fitting. Also
STEAM AND GAS FITTERS' HAND TOOLS,
No. 25 Atherton Street,
YONKERS, N. Y.
SEND FOR CIRCULARS.


NEW YORK CITY. E.M.BOYNTON SAW & FILE CO PAT'D NOV. 25TH 1884
THE WONDER CROSS CUT SAW.
E.M.BOYNTON SAW & FILE CO
BOYNTON BROS.
LATEST PATENT.
E.M.BOYNTON, PRESIDENT.
C.W.BOYNTON, VICE PREST.
PATENTED NOV 25TH 1884
100,000 SOLD.
This is the only authorized INCORPORATED "E. M. Boynton Saw and File Co." in the World. Newly incorporated January 26th, 1885.

THE CUT ABOVE represents our latest patent **"Wonder" Cross-Cut Saw,** of which style of teeth we shall use for our Cross-Cut One-Man Pruning and Buck Saw. This tooth has all the direct fast cut of the Lightning, combined with the clearing teeth of the Champion, making it, as its name indicates, the Latest Wonder, and by actual test we decide an advantage of 20 per cent. over our former world-renowned Lightning Saw. Having newly organized January 26th, 1885, as the E. M. Boynton Saw and File Co., we shall be prepared to fill any orders for the above, as well as for goods which have been furnished our customers throughout the world for the last 14 years.
Respectfully yours,
E. M. BOYNTON SAW AND FILE CO., 99 Chambers St., New York.

THE SHAW DOOR CHECK AND SPRING.
GREAT REDUCTION IN PRICE.

The SHAW DOOR CHECK AND SPRING CO have removed to their new factory, and with their increased facilities for manufacturing their goods have decided to **reduce the price of each Spring $1 from former list,** and thereby bring the machine within the reach of all. The SHAW CO. are the owners of the oldest patented device for closing doors noiselessly, and with their new improvement produce the only check and spring which the trade can sell as general hardware. The same spring can be applied to either hinge or jamb side of both right or left hand doors.
SHAW DOOR CHECK AND SPRING CO.
MANUFACTURERS AND SOLE AGENTS,
Office and Factory, 164 High St., Boston, Mass.
BRANCH OFFICES: 77 Reade St., New York; 239 Lake St., Chicago, Ill.

GEO. M. SCOTT,
Bellows Manufacturer,
Johnson Street,
Cor. 22d St.,
CHICAGO, ILL.


B. KREISCHER & SONS,
FIRE BRICK.
BEST AND CHEAPEST.
ESTABLISHED 1845.
Office, foot of Houston Street, East River, NEW YORK.

NEWTON & CO.,
ALBANY, N. Y.,
MANUFACTURERS OF BEST QUALITY
FIRE BRICK
And STOVE LININGS.

M. D. VALENTINE & BRO.,
MANUFACTURERS OF
FIRE BRICK
And FURNACE BLOCKS.
DRAIN PIPE AND LAND TILE,
Woodbridge, N. J.

BORGNER & O'BRIEN,
MANUFACTURERS
FIRE BRICK
AND
Edge Pressed Furnace Blocks,
Clay Retorts, Tiles, &c.
Twenty-third Street, Above Race, PHILADELPHIA.
Twenty years' practical experience.

ESTABLISHED 1848.
TROY FIRE BRICK WORKS,
Troy, N. Y.
James Ostrander & Son,
MANUFACTURERS OF
FIRE BRICK,
Tiles, Blast Furnace Blocks, &c., and in a *Special Department Linings* for *Stoves, Ranges* and *Heaters* of superior quality. Miners of and dealers in Woodbridge, N. J., Fire Clay and Fire Sand and Staten Island Kaolin.

ESTABLISHED 1864.
JAMES GARDNER,
Successor to GARDNER BROS.,
MANUFACTURER OF
"STANDARD SAVAGE" FIRE BRICK,
TILE & FURNACE BLOCKS,
OF ALL SHAPES AND SIZES
Miner and Shipper of "Mount Savage" Fire Clay.
WORKS, Ellerslie, Alleghenv Co., Md.
MAIN OFFICE, Cumberland, Md., P. O. Box 93.
BRANCH OFFICE, Pittsburgh, Pa., P. O. Box 373.
S. K. Hamilton & Co., Agents, Baltimore, Md.

UNION MINING COMPANY.
Mount Savage Fire Brick.
EDWARD J. ETTING, Agent,
999 South Third St., Philadelphia, Pa.

BIRMINGHAM FIRE BRICK WORKS.
All dimensions constantly on hand. **Fire Bricks, Fire Shapes, Kaolin, Fire Brick Cement, Fire Clay, Fire Sand** for Furnaces; Coke Ovens, Stoves, Boilers, and for the Southern Trade generally.
STEVENS & FENTON, Prop'rs.
Birmingham, Ala.

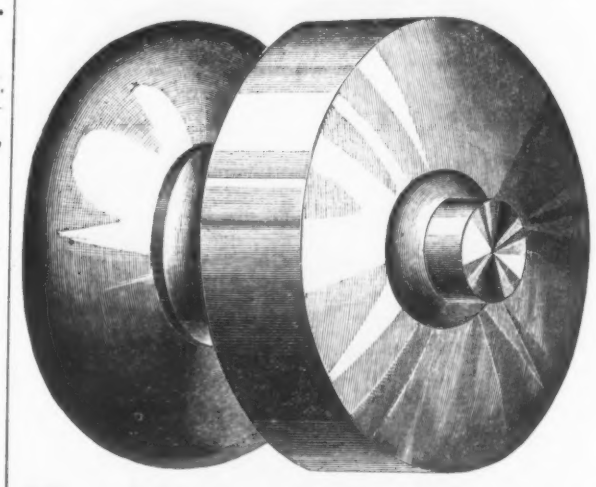
AIKIN & LIGHTON,
Iron City Foundry and Machine Works,
SOLE MANUFACTURERS OF
AIKIN'S IMPROVED PATENTED

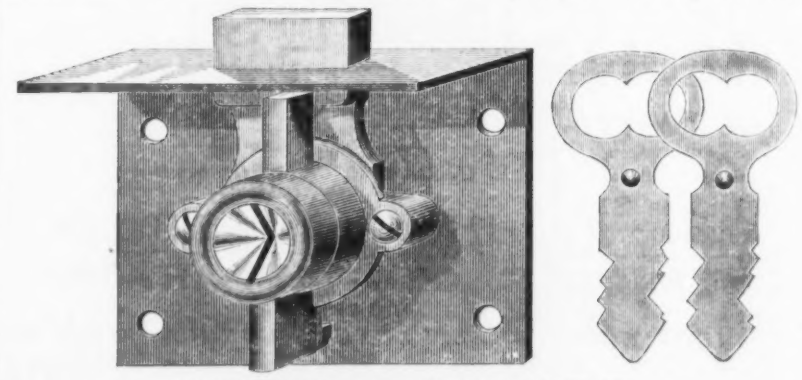
SAND MOULDING MACHINE
BIRMINGHAM, ALABAMA.
CORRESPONDENCE SOLICITED.

AMHERST THE WATER BEST. MOTOR
Parties looking for a noiseless, economical and efficient Power will do well to send for descriptive *Catalogue, free.*
Amherst Hydraulic Motor Company,
HOLYOKE, MASS.

Self-Binders for The Iron Age.

We are now prepared to supply our subscribers with an excellent self-binder for their papers, a cut of which is annexed. We call attention to the low prices at which it is offered. Address all orders to
DAVID WILLIAMS,
83 Reade Street, New York.

New England Butt Co.

PROUTY'S PATENT
RIGID
Door Knobs
AND
Locks
AND OTHER
Builders' Hardware,
Catalogue Sent Free on Application. Providence, R. I., U. S. A.

EAGLE LOCK CO.,
MANUFACTORIES AT
TERRYVILLE, CONN., AND GENEVA, OHIO.
Orders for Special Die and Press Work and Small Brass Castings Solicited at our Terryville Works.
Salesroom at No. 98 CHAMBERS ST., NEW YORK, U. S. A.

MANUFACTURERS OF THE LARGEST VARIETY OF
Cabinet, Trunk and Pad Locks
MADE BY ANY ONE CONCERN IN THE WORLD.
Illustrated Catalogue Mailed to the Trade Free upon Application.

THE WARREN HOE.

Every season we hear of dealers and users seeking this Hoe and not finding it. It is to be had from us when it cannot be obtained to advantage nearer by.
"The best Hoe I ever used," is said to us over and again.
Nothing equal to it in the market for many uses.
Made in Three Sizes and of the best material and workmanship.
SEND FOR CIRCULAR AND PRICES.
BURGESS ILLUSTRATION
MADE ONLY BY **WITHINGTON & COOLEY MFG. CO.,**
Makers of Hoes, Forks, Rakes and Snaths, JACKSON, MICH.

WHITE MOUNTAIN FREEZER CO
MANUFACTURERS OF
Sands' Patent Triple Motion
WHITE MOUNTAIN ICE CREAM FREEZER.

The only Freezer ever made having three distinct motions, thereby producing **finer, smoother Cream than any other Freezer on the market.** Acknowledged by every one to be the best in the world. **Over 300,000 in use to-day.** Outside Irons Galvanized, but all inside the can coated with **Pure Block Tin.** Tubs water-proof; easily adjusted and operated. We also carry large stock of Packing Tubs, Packing Cans, Ice Crushers, &c. Send for Price List and Trade Discounts. Address
WHITE MOUNTAIN FREEZER CO.,
101½ E. Hollis St., Nashua, N. H.

PHILADELPHIA.

Lloyd & Supplee Hardware Co.
Terms, 30 days. For 60 or 90 days, interest added at 8 per cent. per annum.

Anvils.
Peter Wright's, ℔ ..... 9½ @ 10¢
Trenton ..... 9½¢
Eagle Anvils, American, 10¢ ..... dis. 20 %
Apple Parers.
Penn Apple Parers ..... $5.00 net
White Mountain 5.00
Lots of 10 to 25 dozen, special prices.
Axes.
Hunt's Kentucky and Yankee, ℔ doz. net $6.50@7.00
William Mann, ℔ doz. net ..... 6.50@7.00
Favorite ℔ doz. net ..... 5.50@6.00
Beveled Axes ..... add 50¢
Double Bit Axes, net $12.00
Augers and Auger Bits.—New List January 7, 1880.
Snell's Augers and Bits ..... dis. 60@60&5 %
New Haven Copper Company ..... dis. 60&10&5 %
Benjamin Pierce Auger Bits ..... dis. 40 %
Jennings' Auger Bits, new list, Jan. 1, 1884 .dis.. 25 %
Cook's Auger Bits and Augers ..... dis 55 %
Snell's Ship Augers ..... dis 15 @ 20 %
Watrous' Ship Augers ..... dis. 15 @ 20 %
Bonney's Pat. Hol. Augers, list $48 ℔ doz dis ..... 40 %
Stearns Pat. Hol. Augers, list $48 ℔ doz. ..dis. 20&10 %
Balances.
Light and Common ..... dis. 40&10 %
Bells.
Bevin Bros. Mfg. Co. Light Hand Bells dis. 75&10@80 %
Light Hand Bells ..... 80 %
Swiss Pattern Hand Bells ..... 60 %
Connell's Door Bells ..... dis. 20&10 %
Gt. Western & Kentucky Cow, new list ..... dis. 70 %
Boring Machines
Upright, without Augers ..... List, $5.50
Angular, without Augers .... List, 6.75 } dis. 50 %
Bolts.—Eastern Carriage Bolts, new list, June 10, 1884 ..... dis. 80@80&5 %
Philadelphia Carriage Bolts new list. dis 75&10&80 %
Stanley, Wrought Shutter ..... dis. 60@60&5 %
Braces.—Barber's Improved ..... dis. 40@40&5 %
Barber's Old Style ..... 50 %
Backus, Polished ..... dis. 50&10@50&10&10 %
Backus, Nickeled ..... dis. 50&10 %
Spofford ..... dis. 50&5 %
American Ball ..... dis. 55&10 %
Amidon Improved ..... dis. 60@60&10&5 %
Amidon Corner Brace ..... dis. 40@40&10 %
Butts.—Cast Fast Joint, Narrow ..... dis.60&10 %
Cast Fast Joint, Broad ..... dis.60&10 %
Cast Loose Joint, Narrow ..... dis. 70&10 %
Cast Loose Joint, Broad ..... dis. 70&10 %
Cast Acorn, Loose Pin ..... dis. 70&10 %
Cast Acorn, Japanned ..... dis. 70&10 %
Cast Mayer's Loose Joint ..... dis. 70&10 %
Wrought Loose Pin ..... dis. 60&10@60&10&10&5 %
Wrought Table Hinges and Back Flaps..dis. 60&10 @ 60&10&10 %
Wrought Loose Joint..dis. 60&10&10@60&10&10&5 %
Wrought Narrow Fast ..... dis. 60&10 @ 60&10&10 %
Blind Butts.
Parker ..... dis. 75&2 %
Clark ..... dis. 80 %
Shepard ..... dis. 75&10&5 @ 80 %
Lull & Porter ..... dis. 80&10 %
Huffer's ..... dis. 50 %
Casters.—Bed (new list July 1, 1880) ..... dis. 60&5@60
Plate ..... &10 %
Chains.—German Halter and Coll, list June, 1884 ..... dis. 55 @ 55&5 %
Galvanized Pump ..... ℔ 5½@6¼¢ net
Best Proof Coil Chain—English.

℔	9/16	5/8	11/16	3/4	13/16	7/8	15/16
	9¼	6¾	5⅝	5¼	5	4¾	
	3-16	¼	5-16	⅜	7-16	½	

Chisels.—Socket Framing ..... dis 75&10@75&10&5 %
Socket Firmer ..... dis 75&10@75&10&5 %
Butcher's ..... $5.00@$5.25 to £ gold
Coffee Mills.—Box and Side (new list Jan. 1, 1880 ..... dis 40 @ 40&10 %
Enterprise ..... dis 20&10 %
Cutlery.—Walden Pocket ..... new list net
Pennsylvania Knife Co ..... new list net
Landers, Frary & Clark, J. Russell & Co., Lamson & Goodnow Mfg. Co. and Meriden Cutlery Co., Manufacturers' prices net.
Door Hangers.—Cronk Barn Door Hangers...No. 4, $12.00; No. 5, $14.00; No. 6, $18.,00.dis. 50&5@50&10 %
Drawing Knives.
Hart Mfg. Co.'s ..... dis. 75@75&5 %
Adjustable Handle ..... dis 20@20&5 %
Fry Pans.
Tinned ..... dis 45 %

℔ doz..	$3.50	4.00	4.50	5.00	5.50	6.50	7.50	9.00	10.00
No..	0	1	2	3	4	5	6	7	8

Burnished ..... dis 70 %

℔ doz..	$3.00	3.75	4.25	4.75	5.25	6.00	7.00	8.00	9.00
No..	0	1	2	3	4	5	6	7	8

Files.
Nicholson ..... dis 60@60&10 %
Disston ..... dis 60@60&10 %
Butcher ..... 60&5@60&10 %
Crown and Arrow ..... 60&5@60&10 %
Fluting Machines.
Eagle—3½ in. roll ..... each, $2.15 } dis 35 %
Eagle—5½ in. roll ..... each, 2.85 }
Crown—4½ in. roll ..... each, 3.50 } dis 35 %
Crown—6 in. roll ..... each, 4.00 }
Crown—8 in. roll ..... each, 6.50 }
Geneva Fluter ..... dis 25 %
Favorite com. Fluter and Sad Iron..℔ doz..$10.50 net
Hammers.
Yerkes & Plumb's, new list ..... dis 40&10 %
Maydole Hammers ..... dis 15&10 %
Howell A. E. Nail Hammers ..... ℔ doz., net $5.75
Handles.
Disston Loop Handles Cross-Cut ..... 33¢ pair net
Boynton Loop Handles Cross-Cut ..... 22¢ pair net
Hatchets.
Yerkes & Plumb, new list ..... dis 40&10&5 %
Hunt ..... dis 40 %
Hay and Straw Knives.
Lightning ..... ℔ doz., $18.00 dis. 10@10&10 %
Electric ..... ℔ doz., $12.50 net.
Wadsworth ..... ℔ doz., net 35&5 %
Walton Straw Knives ..... ℔ doz., net 17.00
Hinges.
Strap and T ..... dis 65&10 %
Horse Nails.

Nos.	5	6	7	8	9	10	
Globe	26	23	21	20	19	18	dis 10&5&5 %
Ausable	30	27	25	24	23	22	dis 25&10 %
Pol'ed and P't'd & Blued & P't'd.	31	28	26	25	24	23	dis 25&10 %
Clinton	23	21	20	19	18		dis 25&10 %
" Pol'ed & P'ted.	24	22	21	20	19	dis	25&10 %
Saranac	26	23	21	20	19	18	..dis 20&25 %

Locks and Knobs.
Branford Locks ..... 66⅔&2 %
Gaylord Cabinet ..... dis 40&2 %
Parker's Cabinet ..... dis 40&2 %
American Padlocks ..... dis 66⅔&2 %
Scandinavian Padlocks ..... dis 50 %

℔ doz..	$5.00	5.50	6.50	7.50	8.50	10.00	12.50	} dis 60 %
No....	57	58	59	60	61	62	63	
℔ doz.	$18.00			26.00		33.00		} dis 60 %
No.	64			65		66		

Lanterns.
Buckeye ..... large list, net; small list, net
Tubular ..... No. 0, $7.50; No. 1, $9.00 ℔ doz. net
Guards 40¢ extra.
Lawn Mowers.—Pennsylvania ..... } dis 50 %
Philadelphia ..... }
Excelsior ..... }
Continental ..... }
Quaker City ..... }
Lawn and Garden Pumps.
Holland Patent ..... list, $5.00, dis 10 %
Mattocks.
Long and Short Cutter ..... new list. 60&10 %
Pennsylvania Pattern ..... dis 60& 10 %
Molasses Gates.
Enterprise Mfg. Co.'s Measuring Faucets.dis. 20&10 %
Stebbins' Gates ..... dis. 75@75&5 %
Lincoln's Gates ..... dis 70&10 %
Landers, Frary & Clark's Petroleum ....dis 33⅓&10 %
Brass Liquor Cocks new list Jan. 1, 1885.dis.. 65&5 %
Cork Lined Cocks ..... dis. 70 %
Meat Cutters.
Dixon's ..... dis. 40&10%
Woodruff ..... dis. 40&10 %
Stowe ..... dis. 40&10%
Hale's ..... new list. dis. 60, 10&2 cash
American ..... dis 35 %
Stuffers ..... dis. 40 %
Enterprise Stuffers ..... dis. 20&10%
Planes.—Sandusky Tool Co ..... dis 20&2 %
Ogontz ..... dis. 25&2 %
Ohio and Auburn ..... dis. 20&2 %
Bailey (S. R. & L. Co.) ..... dis. 20&10 %
Plane Irons.—Ohio Tool Co ..... dis. 20&10 %
Butcher's ..... $5.00 @ 5.25 to £
Plumbs and Levels.
Stanley's Adjustable ..... dis. 70&10 %
Stanley's Non-Adjustable ..... dis. 70&10 %
Picks.—New list ..... 0@25@60&10 %
Razor Strops.
Lamont Combination ..... ℔ doz. $4.00
Lamont Combination ..... 1 gross lots $42.00
Imitation Emerson ..... ℔ doz.$2.00
Rules.—Stanley Boxwood ..... dis. 80&5@80&10 %
Stanley Ivory ..... dis. 55 @55&10%
Steelyards.—Hart's Pattern dis ..... 40&10@50 %

Per doz.....	$14.50	17.75	21.00	26.50	31.00	35.50
Lbs.....	50	100	150	200	250	300.

American Pattern ..... dis. 40&10@50 %

Per doz.....	$8.00	10.25	13.75	15.00	16.75	19.50
Lbs.....	50	100	150	200	250	300

Scale Beams ..... 60&5@60&10%
Custers ..... 35 %
Squares.
Steel and Iron.dis. 60&10 %; full cases dis. 65&10@70 %
Try Squares, Stanley ..... dis 60&10 %
Disston's Try Squares ..... dis 45&10 %
Scythes.—Golden Clipper, Damascus Blade, Boxed and Sharpened ..... ℔ doz $9.00 } 33 ⅓
Clipper No. 10, Bronzed Blade, Boxed and Sharpened ..... ℔ doz $8.50 }
Clipper No. 5, Painted Red, Boxed and Sharpened ..... ℔ doz $8.00 }
Saws.—Disston's Hand, Panel and Rip.... dis 20&10 %
Disston's Circular ..... dis 45&10 %
Cross-Cut No. 2, Plain Tooth ..... dis 45&10 %
Cross-Cut Patent Tooth ..... dis 45&10 %
Cross-Cut Champion Tooth ..... dis 45&10 %
Shovels and Spades.
Oliver Ames & Sons, new list ..... dis 20 %
Griffiths ..... dis 50&10&60 %
Rowland ..... dis 60&5@60&10 %
Sad Irons.—4 to 10 ℔ ..... ℔ ℔ 2½@2¾¢
Mrs. Potts' Patent ..... dis 40 %
Stone.
Washita Extra ..... ℔ ℔ 17@18¢
Washita No. 1 ..... ℔ ℔ 14@14½¢
Washita No. 2 ..... ℔ ℔ 11½@11¾¢
Washita Slips ..... ℔ ℔ 28&29¢
Washita Axe ..... ℔ ℔ 14¢ net
Hindostan Oil Stone No. 1 ..... ℔ ℔ 8¼ %
Hindostan Axe Stone ..... ℔ ℔ 8¢. dis. 40 %
Hindostan Slips ..... ℔ ℔ 10¢. dis. 40 %
Screws.—Parker List.
Flat Head Iron ..... dis 85 %
Flat Head Brass ..... dis 85 %
Round Head Brass ..... dis 83⅓ %
Round Head Iron ..... dis 83⅓ %
Spoons.
Plated ..... dis 50&10 %
German Silver ..... dis 40&10&50 %
Britannia, Boardman's ..... dis 60 %
Britannia, Parker's ..... dis 60&10 %
Tinned ..... dis 10 %
Springs.—Torrey ..... dis 50 %
Gem No. 3 small Japanned ..... $2.00 } dis 50&10 %
Gem No. 2 medium Japanned ..... 2.75 }
Coil No. 10 ℔ gross net ..... $5.50@6.00
Other Standard Springs ..... dis 50&10@60 %
Warner Door Springs, ℔ doz. $2.50 ..... dis 40&10 %
Standard Spring Hinges—
Single No. 0, ℔ doz. net ..... $1.10@1.25
Single No. 1, ℔ doz. net ..... 1.25@1.50
Other Standard Spring Hinges ..... dis 25&10@40 %
Stocks and Dies ..... dis 10 and 5 %
Stove Polish.—Gem ..... ℔ gross, $4.50, dis 5 %
Dixon ..... 6.00, dis 10 %
Fire Fly ..... $3.00 gross. net
Tacks. ..... Combination discounts
Shoe Nails—4-8, and over, 5½¢ ..... } 10 %
Shoe Nails—3½-8, and under 7¢ ..... }
Double Pointed Tacks ..... dis 75&10 @ 75&10&5 %
Traps.
Genuine Oneida—Newhouse ..... dis 35 %
Im. Oneida—Newhouse list. First qual. dis 60&10&10 %
Vises.—Solid Box. Trenton new list..dis 50&10@60 %
Wrenches.—Agricultural ..... dis 75&10&5 %
Coes' Genuine ..... dis 60&3 %
Coes' Mechanics' ..... dis 60&10&3 %
Coes' Mechanics,' Mall. Bar ..... dis 80 @ 80&5 %
Wire.
Bright or Annealed, No. 0 to 18 ..... dis 70 %
Bright or Annealed, No. 19 to 26 ..... dis 65 %
Bright or Annealed, No. 27 to 30 ..... dis 70 %
Coppered, 0 to 18 ..... dis 60&3 %
Tinned Broom Wire ..... dis 65 %
Galvanized Barb Wire ..... dis 65 %
Painted Barb Wire ..... 5½¢
Galvanized, No. 7 to 18..Market List, dis ..... 60 %
Wringers.
Peerless No. 2½ $30.00
Peerless No. 2 ..... 33.00
Universal No. 2½ ..... 30.00 } dozen lots $3.00 per dozen.
Universal No. 2 ..... 33.00 }
Novelty No. 2, for common tubs ... 30.00 }
Novelty No. 3, " " ... 34.50 }
Excelsior E, for stationary tubs ... 39.00 }
Excelsior F " " ... 43.50 }

PITTSBURGH.

Merchant Iron.

TERMS.—Note or acceptance at 60 days, with current rate of exchange on New York, or a discount of 2 ℔ cent. for cash, if remitted within 10 days from date of invoice.

For fluctuations and discounts on card rates see weekly Pittsburgh Trade Report.

The following are card rates.

Flat Bar.

1½ to 4 by ⅜ to 1 inch ..... 2.0¢
4¼ to 6 by ⅜ to 1 " ..... 2.1¢
1¾ to 6 by 1¼ to 1½ " ..... 2.1¢
1¼ and 1⅜ by ⅜ to ¾ " ..... 2.1¢
1 and 1¼ by ⅜ to ¾ " ..... 2.2¢
⅝, ¾ and ⅞ by ⅜ to ⅝ inch ..... 2.4¢

Rounds and Squares.

1 to 1¾ ..... 2.0¢ | ⅝ to 9-16 ..... 2.2¢
2 to 2¾ ..... 2.2¢ | ½ to 7-16 ..... 2.4¢
2¾ to 3¼ ..... 2.5¢ | ⅜ ..... 2.6¢
3¼ to 4 ..... 3.0¢ | 5-16 ..... 2.8¢
4¼ to 5 ..... 3.5¢ | ¼ ..... 3.0¢
5¼ to 7¼ ..... 2.1¢ | 3-16 ..... 5.0¢

Oval Iron.

⅞ to 1¼ ..... 2.4¢ | ⅛ ..... 2.8¢
⅝ to ¾ ..... 2.6¢ | ⅜ ..... 3.2¢

Half Oval and Half Round.

⅞ to 1¼ inch ..... 2.7¢ | ⅛ inch ..... 3.5¢
⅝ to ¾ " ..... 3.2¢ | ⅜ " ..... 5.0¢

Horse Shoe.

⅝ to 1¼ by 5-16 to ⅞ inch ..... 3.0¢

Wagon Box Iron.

⅞ inch, Nos. 13 and 14 ..... 3.2¢
⅞ " " 11 and 12 ..... 3.0¢
¾ " " 13 and 14 ..... 3.5¢
¾ " " 11 and 12 ..... 3.3¢
⅝ " " 13 and 14 ..... 3.9¢
⅝ " " 11 and 12 ..... 3.6¢

Heavy Bands.

3½ to 6 by ¼ and 5-16 inch ..... 2.2¢
1¼ to 3½ by ¼ and 5-16 " ..... 2.2¢
1 to 1¾ by ¼ and 5-16 " ..... 2.3¢
¾ to 1¾ by ¼ and 5-16 " ..... 2.5¢
⅜ and ½ by ¼ and 5 16 " ..... 3.0¢

Light Bands.

1¼ to 6 by ⅛ to 3-16 ..... 2.5¢
1¼ to 6 by Nos. 11 and 12 ..... 2.6¢
1 to 1¾ by ⅛ to 3-16 ..... 2.6¢
1 to 1¾ by Nos. 11 and 12 ..... 2.7¢
⅞ and 13-16 by ⅛ to 3-16 ..... 2.9¢
⅞ and 13-16 by Nos. 11 and 12 ..... 3.0¢
¾ and 11-16 by ⅛ to 3-16 ..... 3.2¢
¾ and 11-16 by Nos. 11 and 12 ..... 3.3¢
⅝ and 9-16 by ⅛ to 3-16 ..... 3.5¢
⅝ and 9-16 by Nos. 11 and 12 ..... 3.6¢
½ inch by ⅛ and 3-16 ..... 3.8¢
½ inch by Nos. 11 and 12 ..... 3.9¢

Hoop Iron.

1¼ to 4, Nos. 13, 14 and 15 ..... 2.8¢
1¼ to 2, Nos. 16, 17 and 18 ..... 2.9¢
1¼ to 2, No. 19 ..... 3.0¢
1¼ to 2, No. 20 ..... 3.1¢
1¼ to 2, No. 21 ..... 3.2¢
1¼ to 2, No. 22 ..... 3.3¢
15-16, 1, and 1¼, Nos. 13, 14 and 15 ..... 3.0¢
15-16, 1, and 1¼, Nos. 16, 17 and 18 ..... 3.1¢
15-16, 1, and 1¼, Nos. 19 and 20 ..... 3.2¢
15-16, 1, and 1¼, No. 21 ..... 3.3¢
15-16, 1, and 1¼, No. 22 ..... 3.4¢
⅞, Nos. 13, 14 and 15 ..... 3.2¢
⅞, Nos. 16, 17 and 18 ..... 3.3¢
⅞, Nos. 19 and 20 ..... 3.4¢
⅞, No. 21 ..... 3.5¢
⅞, No. 22 ..... 3.6¢
13-16, Nos. 13, 14 and 15 ..... 3.4¢
13-16, Nos. 16, 17 and 18 ..... 3.5¢
13-16, Nos. 19 and 20 ..... 3.6¢
13-16, No. 21 ..... 3.7¢
13-16, No. 22 ..... 3.8¢
¾, Nos. 13, 14 and 15 ..... 3.5¢
¾, Nos. 16, 17 and 18 ..... 3.6¢
¾, Nos. 19 and 20 ..... 3.7¢
¾, No. 21 ..... 3.8¢
¾, No. 22 ..... 3.9¢
11-16, Nos. 13, 14 and 15 ..... 3.7¢
11-16, Nos. 16, 17 and 18 ..... 3.8¢
11-16, Nos. 19 and 20 ..... 3.9¢
11-16, No. 21 ..... 4.0¢
11-16, No. 22 ..... 4.1¢
⅝, Nos. 13, 14 and 15 ..... 3.9¢
⅝, Nos. 16, 17 and 18 ..... 4.0¢
⅝, Nos. 19 and 20 ..... 4.1¢
⅝, No. 21 ..... 4.2¢
⅝, No. 22 ..... 4.3¢
⅝, No. 23 ..... 4.4¢
9-16, Nos. 13, 14 and 15 ..... 4.1¢
9-16, Nos. 16, 17 and 18 ..... 4.2¢
9-16, Nos. 19 and 20 ..... 4.3¢
9-16, No. 21 ..... 4.4¢
9-16, No. 22 ..... 4.5¢
9-16, No. 23 ..... 4.6¢
⅛ inch, Nos. 13, 14 and 15 ..... 4.3¢
⅛ inch, Nos. 16, 17 and 18 ..... 4.4¢
⅛ inch, Nos. 19 and 20 ..... 4.6¢
⅛ inch, No. 21 ..... 4.7¢
⅛ inch, No. 22 ..... 4.8¢
⅛ inch, No. 23 ..... 4.9¢

The prices under Hoop Iron do not apply to Cotton Ties.

1-10¢ ℔ ℔ extra will be charged for each gauge lighter than the lightest indicated.

1-10¢ ℔ ℔ extra will be charged for cutting Hoops to specified lengths.

Barrel Hoops.
1¼ to 2 in., cut to length.
9 to 11 ℔, ℔ set of 6 hoops ..... 3.0¢
8 ℔ and less than 9 ℔, ℔ set of 6 hoops ..... 3.1¢
Less than — ℔, ℔ set of 6 hoops ..... 3.2¢

Extras for Cutting to Length all Preceding Iron. ..... 1.10¢

All Iron, including Tire.
Tank Iron.
No. 9 and heavier ..... 2.8¢
Plow Slabs ..... 3.0¢
Plow Wings ..... 3.3¢

Sheet Iron.

	Common.	Charcoal.	Juniata.
Nos. 10 to 14	3.0¢	4.5¢	6.0¢
Nos. 15 to 17	3.3¢	4.8¢	6.3¢
Nos. 18 to 21	3.6¢	5.1¢	6.6¢
Nos. 22 to 24	3.8¢	5.3¢	6.8¢
Nos. 25 and 26	4.0¢	5.5¢	7.0¢
No. 27	4.2¢	5.7¢	7.2¢
No. 28	4.6¢	6.1¢	7.6¢

All sheets No. 18 and lighter, over 30 inches wide, not less than 2.10¢ extra.

Wood's Patent Planished Sheet.
1st quality (A) ..... 10¢ | 2d quality (B) ..... 9¢
Galvanized C. H. B.—(Charcoal Hammered Blooms.)

Nos. 14 to 20	12¢	No. 27	15¢
Nos. 21 to 24	13¢	No. 28	16¢
Nos. 25 and 26	14¢	No. 29	18¢

57 @ 60 % discount.

Coal Screen Iron.
1¾ by ⅝ by 5-16 ..... 2.5¢ | 1 by ⅝ by 5-16 ..... 3.0¢
Angle Iron.
2½, 3, 3½ and 4 inch ..... 2.8¢
1¾, 1¼, 2 and 2¼ " ..... 2.8¢
1¼ inch ..... 2.9¢
1 " ..... 3.1¢
1¼ by 1 inch, for Plow Handles ..... 3.3¢
1¼ by ¾ " " " ..... 3.3¢
1⅛ by ¾ " " " ..... 3.4¢

T Rail.
8 lbs. to the yard ..... 2.4¢ | 20 lbs. to the yard ..... 2.8¢
12 " " ..... 2.3¢ | 28 " " ..... 2.3¢
16 " " ..... 2.3¢ | 30 " " ..... 2.3¢

Splice Joints for 12, 16 and 20 ℔. Rail, 30¢ each; 28 and 30-℔. Rail, 40¢ each; 40-℔., 50¢ each.
3½ by ¾ and ⅛ Spikes for 20 and 28-℔. Ra l ..... 3½¢
2½ and 3 by ⅜ " " 12 and 16-℔. " ..... 3.5¢
2½ by 5-16 " " 8-℔. Rail ..... 4.0¢

Flat Rails.—Punched and Countersunk.
1¼ to 2 by ⅛ to ⅝ inch ..... 2.5¢
1½ by ¾ and 7-16 inch ..... 2.7¢
1¼ by ⅝, 7-16 and ½ inch ..... 3.0¢

Juniata Nail Rods ..... 6.0¢
Norway Nail Rods ..... 7.5¢
Guard Iron, ¼x¾x¾ and ¼x⅝x⅝ ..... 3.5¢
Guard Iron ¼x⅝x9-16 and ¼x⅝x¾ ..... 3.7¢
Drag Bars ..... 2.8¢
Dropper Bars ..... 3.3¢
Cylinder and Landside Iron ..... 2.7¢
Plow Beam Iron ..... 3.5¢

Nails.
See Pittsburgh Trade Report.

Best Quality Refined Cast Steel.
Square, Flat, Octagon and Round.

⅝ to 2 inches, inclusive ..... 8¢
1-16 and 2⅛ to 3 inches ..... 9¢
¼ and 3⅛ to 4 " ..... 10¢
7-32 and 4⅛ to 5 " ..... 11¢
3-16 and 5⅛ to 6 " ..... 14¢
5-32 inch ..... 18¢
⅛ " ..... 25¢
Oil Well Steel Forgings ..... 18¢

Machinery Steel.

	Crucible	Bessemer & Open Hearth.
Ordinary Sizes, ⅜ to 2 inch Round	4¢	2½¢
5-16 and 2⅛ to 3 inches	5¢	3½¢
¼ and 3⅛ to 6 "	6¢	4½¢
7-32 inch	7¢	5½¢
3-16 "	9¢	8 ¢

Square, Flat and Octagon, ½¢ extra throughout the list.
Cut to specified lengths, ½¢ extra.
Hammer Cast Steel.
Crucible Cast Steel ..... 5¢
Open Hearth Cast Steel ..... 4¢
Sheet Steel.—Crucible.

	Best.	2d Qual.	3d Qual.	Bessemer & Open Hearth.
To 21 gauge	9¢	8¢	6¢	5¢

1¢ extra for each additional gauge.
Cut to multiples or specified lengths, ½¢ extra.
Miscellaneous Cast Steel.
Auger and Auger Bit ..... 3¢
Axle Steel for carriages and wagons ..... 3¢
Frog Points and Plates ..... 5½¢
Frog Side Bars ..... 5¢
Pick, plain (hammered) ..... 5¢
Pick and Mattock, beveled (rolled ..... 3¢
Skate Steel ..... 4½¢
Table Cutlery, plain ..... 3½¢
Table Cutlery, beveled ..... 4¢
Pike and Cant Hook ..... 7¢
Coal and Granite Wedge ..... 7¢
Roller ..... 5½¢
Spindle, subject to Machinery classification ..... 5½¢
Trap Spring Steel ..... 6¢
Forged Crank Pins and Lathe Spindles ..... 7½¢
Piston Rods, plain ..... 4¢
Piston Rods, forged to shapes ..... 7½¢
Slide Bars, plain ..... 5¢
Slide Bars, forged to shapes ..... 7½¢
Open Hearth or Bessemer
Boiler, Fire-Box and Flue Sheets, not less than 3-16 thick ..... 4¢
Boiler, Fire-Box and Flue Sheets, not less than ¼ thick ..... 5¢
Circulars and semi-circulars, when ordered separately ..... 6¢
Smoke Stack, to shape ..... 5¢
Locomotive Tank Steel ..... 4¢
File Cast Steel.
Square, Round, Half Round and Flat Bastard, 8 inch and over ..... 5¢
Mill Saw, 8-inch and over ..... 6¢
Taper, 3½ inch and over ..... 6¢
Horse and Shoe Rasp ..... 5¢
Spring Cast Steel. ..... 4¢
Spiral, Taper, cut to lengths ..... 5½¢
Tire Cast Steel.
1x¼ and over ..... 6½¢
1x3-16, ⅞x3-16 and ¼ ..... 7¢
1 and 13-16x⅛ and 5-32, ¾x3-16 and 5-32 ..... 9¢
⅝ and ⅝x¼ and 3-32 and 12 g ..... 10¢
Solid Safe Cast Steel ..... 4¢
Three and Five Ply Cast Steel ..... 5¢
Agricultural Implement Cast Steel.
Fork and Rake, Crucible ..... 4¢
Horse Rake Steel, cut to lengths, Crucible ..... 5¢
Hoe, Crucible ..... 5¢
Corn Stalk Cutter, beveled ..... 4¢
Beveled Hoe and Shovel Steel in Bars ..... 4½¢
Crucible Plow Steel in Slabs ..... 4¢
Bessemer and Open Hearth.
Spring ..... 2½¢
Spring spiral and taper, cut to lengths ..... 3½¢
Tire, 2-16 thick and above ..... 2½¢
Toe Calk ..... 2½¢
Plow ..... 2½¢
Axle Billets ..... 2 ¢
Sleigh Shoe ..... 2½¢
Cutter Shoe, cut to lengths and tapered ..... 3¢
Scythe Back Steel ..... 3¢
Grain Drill Bars ..... 2½¢
Grain Drill Points ..... 3½¢
Rolling Coulter Blanks, cut and punched ..... 6¢
Thrasher Steel ..... 2½¢
Thrasher Teeth ..... 3½¢
Rolled Hammer Billets ..... 2½¢
Terms.—Four months · 8 per cent. discount for cash. If remitted within 30 days.

Rolls and Castings.
Furnace Floor and Straightening Plates ..... 1½¢
Housings and Castings not otherwise specified ..... 2 ¢
Guide Plates ..... 2½¢
Spindles and Coupling Boxes ..... 1½¢
Sand Rolls and Pinions, large size ..... 2 ¢
Sand Rolls and Pinions, small size ..... 2½¢
Pipe Mill Castings ..... 3 ¢
Rolling Mill Castings under 50 ℔ ..... 2 ¢
Spur and Bevel Wheels, large ..... 3¢
Spur and Bevel Wheels, small ..... 3½¢
Pulleys up to 30 inches ..... 4 ¢
Pulleys over 30 inches ..... 3½¢
Engine Castings, light ..... 3½¢
Engine Castings, heavy ..... 2½¢

White and Red Lead.
Strictly Pure White Lead in Oil, in Kegs 6½¢ ℔ ℔ · in 25℔ Cans, packed in 100 ℔ cases, ½¢, and 12½ ℔ cans' 1¢ over keg price; in 1 to 5 ℔ Cans, assorted, in 100 ℔ cases, 2½¢ over keg price.
Strictly Pure Dry White Lead in kegs ..... 6½¢ ℔ ℔
Strictly Pure Red Lead *extra bright and fine*, in kegs ..... 6½¢
Strictly Pure Litharge, *powdered, extra fine*, in kegs 8½¢
Orange Mineral, *True*, in barrels ..... 8½¢
" " in 100 ℔ kegs ..... 8½¢
Terms: Note or acceptance at 60 days; or less 2½ % for cash if paid within 15 days from date of invoice.
Freight equalized with all points where White Lead is made.

Window Glass.
Discount, 75% *Single Strength* 75 & 10% *Double*. Prices current, ℔ box of 50 feet.

Single Strength.

United Inches	Sizes.	AA.	A.	B.	C.
25	6 x 8 to 10 x 15	$8.75	$8.00	$7.50	$7.00
30	11 x 14 to 15 x 24	9.25	8.50	8.00	7.25
48	16 x 24 to 20 x 28	10.75	9.75	8.75	7.75
54	15 x 34 to 24 x 30	12.25	10.75	9.00	....
60	26 x 28 to 24 x 36	13.00	11.50	9.75	....
70	26 x 36 to 26 x 44	14.50	13.25	10.75	....
80	26 x 46 to 30 x 50	15.00	14.00	11.25	....
84	30 x 52 to 30 x 54	....	....	....	....
90	30 x 56 to 34 x 56	....	....	....	....
94	34 x 58 to 34 x 60	....	....	....	....
100	36 x 60 to 40 x 60	....	....	....	....

Double Strength.

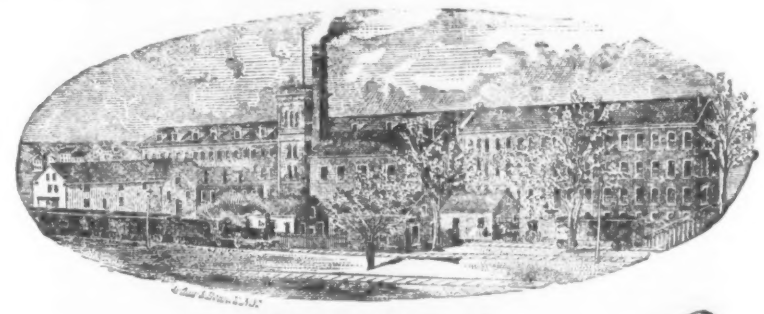
25	6 x 8 to 10 x 15	13.25	12.25	11.25	10.50
30	11 x 14 to 15 x 24	14.50	13.25	12.50	11.25
48	16 x 24 to 20 x 28	17.25	15.75	14.00	....
54	15 x 34 to 24 x 30	19.75	17.25	14.50	....
60	26 x 28 to 24 x 36	$21.00	18.50	15.75	....
70	26 x 36 to 26 x 44	23.25	21.25	17.25	....
80	26 x 46 to 30 x 50	24.00	22.50	18.00	....
84	30 x 52 to 30 x 54	25.75	23.25	19.25	....
90	30 x 56 to 34 x 56	27.75	25.00	21.75	....
94	35 x 58 to 34 x 60	29.25	27.75	24.00	....
36	x 60 to 40 x 60	33.25	30.00	27.75	....

Sizes above — $10 ℔ box extra for every 5 inches.
An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 52 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches bracket.

Hubbard, Bakewell & Co.'s Goods.

Axes, Single Bit, Lippincott	per doz., $6.50
Axes, Single Bit, James & Co	per doz., 5.50
Axes, Double Bit, Lippincott	per doz., $12.00
Axes, Double Bit, James & Co	per doz., 10.00
Drain Tools, list	dis 20&7½ %
Hoes, Planters'	dis 60 %
Hoes, Seovill Pattern	dis 60 %
Hoes, Handled, Square Eye, German	dis 60 %
Handles, Cross Cut	per doz., $2.25
Handles, Shovel, Bent, Bored, Riveted	per doz., 2.00
Saws, Circular	dis 50 %
Saws, Long	dis 45 %
Saws, Cross-Cut, H. B. & Co., Champion, per foot net	$0.27
Saws, Cross-Cut, Lippincott, Champion, per foot net	$0.25
Shovels, list	dis 20&7½ %
Spades, list	dis 20&7½ %

THE STANLEY WORKS



MANUFACTURERS OF

Wrought Iron

BUTTS, HINGES

AND

DOOR

BOLTS

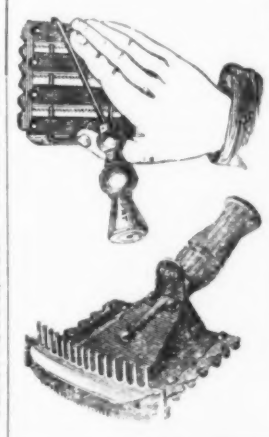
FACTORIES:
New Britain,
Connecticut.

WAREHOUSE:
79 Chambers Street, New York.

GOODS FURNISHED PLAIN, GALVANIZED, JAPANNED, BRONZED AND NICKEL PLATED.

Also Manufacturers of TACKS, BRADS AND NAILS.

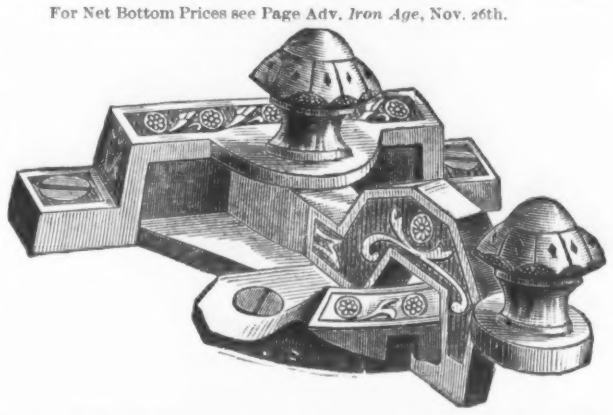
LAWRENCE CURRY COMB CO.,
309 East 22d Street, New York.



Our line of Perfect Curry Combs is so well known it needs no comment. Also our Elevated Back Curry Comb (see cut) is rapidly growing in favor and offered at prices highly satisfactory to the Trade. We have just completed our Metallic Boring Machine, with Adjustable Handle or Crank, whereby a greater or less leverage can be obtained, as

BROUGHTON'S
BURGLAR-PROOF SASH LOCKS.
(Patented Oct. 7th, 1879.)
FOR NET BOTTOM PRICES SEE PAGE AD. IN IRON AGE, Nov. 26th.

For Net Bottom Prices see Page Adv. *Iron Age*, Nov. 26th.



No. 210, Ornamental Iron, Iron Knob, fine finish, Etruscan Bronze.....$0.60
No. 211, Ornamental Iron, Iron Knob, fine finish, Olympian Bronze.....75
No. 212, Ornamental Iron, Iron Knob, fine finish, Pompeii Bronze.....85
No. 213, Ornamental Iron, Iron Knob, Nickel-plated.....1.25
No. 214, Ornamental Iron, Iron Knob, Nickel-Plated Rich Old Gold inlaid.....1.50
No. 215, Ornamental Iron, Iron Knob, Nickel-plated, Pale Old Gold inlaid.....1 60
No. 216, Ornamental Iron, Iron Knob, Nickel-plated, Fire Old Gold inlaid.....1.75
No. 21 Ornamental Iron, Iron Knob, Nickel-plated, Crimson Old Gold inlaid.....1.85
No. 218, Ornamental Iron, Iron Knob, Nickel-plated, Blue Old Gold inlaid.....1.90
No. 219, Ornamental Iron, Iron Knob, Nickel-plated, Green Old Gold inlaid.....1.95
No. 220, Ornamental Iron, Iron Knob, Nickel-plated, Copper Old Gold inlaid.....2.00
No. 221, Ornamental Iron, Iron Knob, Nickel-plated, Lemon Old Gold inlaid.....2.05
No. 222, Ornamental Cast Brass, Polished and Lacquered.....2.65
No. 223, Ornamental Cast Brass, Nickel-plated.....3.60

MANHATTAN HARDWARE CO.,

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MANUFACTURERS OF

LOCKS Of Every Description,

AND A FULL LINE OF

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Special net prices to be found in *Iron Age* whenever changes occur.
The only manufacturers in the United States who quote bottom prices to all dealers without favoring any class.
Fine Gray Iron Castings of every description, also Real Bronze and Brass Castings, made to order at very low prices; Pattern Making, Japanning, Bronzing, Tinning, &c.
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And Constructors of Iron and Steel Bridges, Viaducts, Roofs, Elevated Railroads, Marine Piers, Etc.

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Steel Door Hangers

FOR EVERY PURPOSE.

Anti-friction Steel Barn Door Hangers.
Three sizes of Steel Common Hangers.
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Heavy and Extra Heavy Anti-friction Hangers for Warehouses, Freight Depots, &c.
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Special shapes and sizes of Hangers made to order.
All Hangers made for either Iron or Wood Track.
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The most complete and finest line of these goods manufactured.
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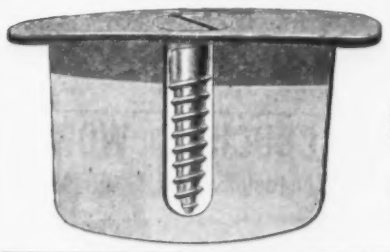
Hub Malleable Iron Axe Wedges.



PATENTED NOVEMBER 21, 1882.

It Can be Taken Out Easily.

The screw holds the wedge in place. Take out the screw and the wedge can be easily removed, allowing the handle to be withdrawn from the axe. Try them and you will buy no other. Send for sample.

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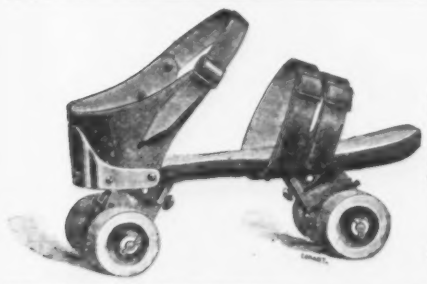

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Made of the very best materials; simple in construction; light and neat in appearance; noiseless in movement; easy to keep in order; finished in thorough and workmanlike manner; warranted to possess all the qualities and requirements necessary for any and all purposes where ROLLER SKATES ARE USED. **Rubber Cushion held in Patent Adjustable Box; can be raised or lowered at pleasure to take up all wear.**
Send for Circular.

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THE BEST IS THE CHEAPEST.

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Cases Electric Apparatus for all the various modes of lighting and transmitting of Power are in operation. **No other** system is as **economical** in Installation and Maintenance. **No other** Electric Light is as **durable**—the first machines made are still in daily operation.

The System Comprises
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- Arc and Incandescent Lights from one Dynamo and Circuit.
- Incandescent Lights of various sizes from special Dynamo for Central Station Lighting.

Cost of Apparatus greatly reduced. *Surveys and Estimates by experts.*

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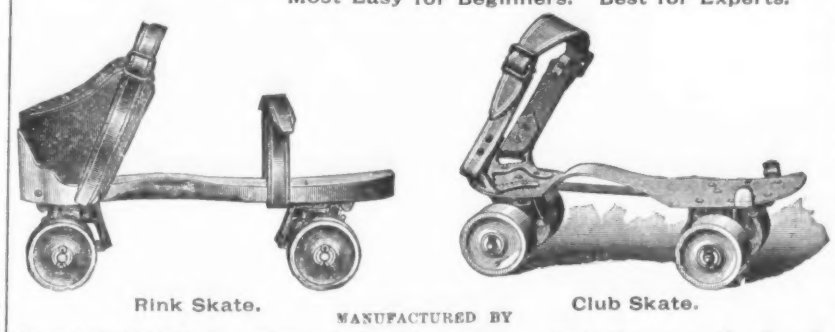
SOMETHING NEW.

Ball Bearing and Ratchet Movement.
Most Easy for Beginners. Best for Experts.



Rink Skate. Club Skate.

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Send for Catalogue.

ROOT'S HANDY CLOTH-BOUND HARDWARE PRICE CARDS,

For Either Wholesale or Retail Trade.

COPYRIGHTED 1885.

These Cards have only been in print *one month* and have already reached a *Second Edition* on several numbers. They cover the lines having a large variety of sizes or numbers, avoid marking each package or article, in Retail Stores, and are very convenient for use in Wholesale Sample Rooms. They secure correct and uniform selling prices, save time, and no Hardware Dealer can afford to do without them. They are printed in *very distinct type*, on the best *Ledger Paper*, appropriately ruled with blue ink cross lines and red ink down rulings, for noting in pencil—*List, Cost, Jobbing and Selling Prices.* They are mounted on both sides of a tough, heavy card-board, especially adapted for this use, which is further protected on the four edges by being *cloth-bound*. Two-THIRDS of them are 3 x 13½ inches. This size has been found convenient for hanging on any narrow surface, without hiding the goods. In the top of each Card a nickel-plated eyelet is firmly inserted.

PRICES IN SETS.

Set No. 1.	Includes all the numbers, 1 to 32 inclusive	Price,	$10.00 per Set.
Set No. 2.	Omits Cards Nos. 25, 26, 27, and includes all the other numbers described above	"	8.00 "
Set No. 3.	For Dealers in **Tinware and House Furnishing Goods**, consists of Cards Nos. 25, 26, 27	"	2.00 "
Set No. 4.	Includes the following **Eighteen** Leading Cards for Retail Trade: Nos. 2, 3, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 22, 23, 24, 28, 31, 32	"	5.00 "

Write for a Circular giving detailed description and Price of each Card. They are sold separately at prices ranging from *Twenty to Seventy Cents Each*. Twenty numbers out of the Thirty-two are *Thirty Cents Each*. Unmounted Price Sheets can be furnished at *half* the Price of Mounted. Postage stamps can be enclosed for *Sample* cards or amounts of less than One Dollar. Full sets will be sent, subject to approval, to parties willing to prepay return charges on any numbers not suited to their use.

SENT, CHARGES PREPAID, ON RECEIPT OF PRICE, BY

T. W. ROOT, - Detroit, Mich.

Or DAVID WILLIAMS, 83 Reade St., New York.

Dog Collars,
Dog Muzzles,
Dog Whips,
Dog Combs,
Dog Brushes,
Dog Bells,
Dog Couplings,

And all Styles of Dog Furnishings.

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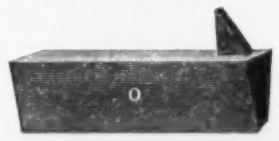
Manufacturers of

PATENT STEEL

Toe Calks.



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Send for Catalogue to

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COHOES, N. Y.

NORTH BROTHERS,

Iron Founders,

Light Castings a Specialty.

W. Cor. 23d and Race Streets,

PHILADELPHIA.

Correspondence solicited.

BOSTON.

Reported by Bigelow & Dowse.

Anvil & Vise.—

	10	20	30	40	
Cheney	$3.50	4.50	5.50	6.50	dis 25 %

Eagle, Fisher & Norris, No. 00, $1.75; 0, $2.25; 1, $2.75; 2, $3.25; 3, $4.00; 4, $4.50; 5, $5.25; 6, $6.00; 7, $6.50; 8, $7.25; 9, $8.25.
100 ℔ and over 10¢ ℔ ..... dis. 20 %

Augers & Bitts.—
L'Hommedieu's Ship Auger ..... dis 15 %
Jenning's Bitts ..... dis 25 %
Cook's Bitts ..... dis 50 %
Shepardson's Double-Cut Bitts ..... dis 45 %
Shepardson's Double Gimlets ..... dis 40 %
Stearn's Extension Hollow Augers—
No. 2, ₱ doz., $48; No. 3, ₱ doz., $60 list ..... dis 20 %
Bonney's Extension Hollow Augers ..... ₱ doz $36.00
Pierce's Bitts ..... dis 50 %
Griswold Bitts ..... dis 60&10 %

Axes.—Blue Jackets ..... ₱ doz $7.50
Dowse Handled Boys' ..... dis 35 %

Ax Handles.—
Oak Extra, 31 in., No. A ..... ₱ doz $2.50
Oak Extra, 34 in., No. A ..... ₱ doz 2.50
Oak Extra, 31 in., No. B ..... ₱ doz 2.00
Oak Extra, 34 in., No. B ..... ₱ doz 2.00
Oak Extra, 31 or 34 in., No. C ..... ₱ doz 1.40

Axle Clips ..... dis 50 %
Balances.—Chatillon's ..... dis 40 %
Barn Door Rail.—
Cast Angle (for Anti-Friction Hangers) ..... ₱ ft., 2¢
Cast Half Round ..... ₱ ft., ¾, 2½¢; ⅞, 3¢
Wrought Round ..... ₱ ft., ⅝, 3¢; ⅞, 4¢; 1¼, 6¢
Bells.—Connel's Crank Gong, reduced list.. dis 20&10 %
Bird Cages.
Japanned M. B. & D., reduced list, 1879 ..... dis 40 %
Brass M. B. & D. reduced list, 1879 ..... dis 33⅓ %
Blind Fasts.
No. 6 Fasts ..... ₱ C sets 6.00
Shedd's ..... ₱ C sets 6.50
Blind Hinges.—Mall. Hook, 3 holes .. ₱ C sets 7.00
Blocks.—Tackle ..... dis 20 %
Brad Awl Handles.—
Phœnix Adjustable ..... ₱ doz $2.00
Bolts.—Norway Iron Carriage ..... dis 75 %
Common Carriage, new list ..... dis 75&10 %
Eagle Carriage ..... dis 75 %
Borax.—Refined ..... ₱ ℔ 12¢
Boring Machines.—
Eagle Upright, each ..... $5.50 list } dis 50 %
Eagle Angle, each ..... 6.75 list }
Braces.—Barber's ..... dis50 %
Spofford's ..... dis 50&5 %
Backus's
Bracket Saws.—Holly Scroll Saw ..... each $2.25
Bracket Saws, extra quality, to No. 5 ..... ₱ gro. 0.75
Steel Frame, with patterns ..... ₱ doz 6.00
Lever ..... dis 20 %
New Rogers, all iron ..... dis 25 %
Bracket Saw Blades.—Griffith's pat., ₱ gross 75¢
Brackets.—
F. S. & W. Flower Pot, reduced list ..... dis 40&10 %
Bronzed Shelf M. B. & D., new list ..... dis 50&10 %
Store Shelf ..... dis 40&10 %
Butts.—Union Fast Joint ..... dis 60&10 %
Union Loose Joints ..... dis 70&10 %
Union Japanned Acorn ..... dis 70&10 %
Union Silvered Acorn ..... dis 70&10 %
Union Boston Finish ..... dis 75&10 %
Union Spiral Spring ..... dis 25&10 %
Wrought Brass ..... dis 70 %
Carriage Bolts.—Eagle Norway ..... dis 75 %
Common, new list ..... dis 75&10 %
Carriage Jacks.—Climax No. 1 ..... ₱ doz $20.00
Climax No. 1½ ..... ₱ doz 15.00
Climax No. 2 ..... ₱ doz 13.50
Universal ..... dis 25 %
Universal No. 1 ..... each $2.00
Universal No. 2 ..... each 3.00
Universal No. 3 ..... each 6.00
Universal No. 4 ..... each 6.00
Universal No. 5 ..... each 6.50
Cartridges.—U. S. Cartridge Co. ..... dis 60 %
Cards
Watson's make Horse & Curry ..... dis 10 % } Rev. List.
Watson's Cotton ..... dis 10 % } Aug., 1883.
Watson's Wool ..... dis 10 % }
Casters.—Bed and Table ..... dis 50&10 %
Chain.
Coil 3-16 ..... ₱ ℔ 9¢
Coil ¼ ..... ₱ ℔ 7¢
Coil 5-16 ..... ₱ ℔ 6¢
Coil ⅜ ..... ₱ ℔ 5¢
Coil 7-16 ..... ₱ ℔ 5¢
Coil ½ ..... ₱ ℔ 5¢
Chalk.—White, Carpenter's ..... ₱ gross 60¢
Red, Carpenter's ..... ₱ gross 80¢
Blue, Carpenter's ..... ₱ gross $1.00
Crayons ..... 12¢
Chisels.—Peck, Stow & Wilcox ..... dis 70&10 %
Underhill, Framing ..... dis 35 %
Buck's Chisels ..... dis 30 %
Coal Hods.—Galv'd, New List ..... dis 60 & 10 %
Japanned, New List ..... dis 60 & 10 %
Cocks.—Brass. L. F. & Co. ..... dis 50&10 %
Coffee Mills.—New List ..... dis 40 %
Copper Rivets.—..... dis 50 %
Cordage.—Manila, usual trade dis 1¢ ..... ₱ ℔ 13¢
Jute ..... ₱ ℔ 7¢
Cow Ties. ..... dis 50&10 %
No. 30 3 ft. No. 6 Wire, with toggle ..... ₱ doz $3.80
No. 35, 3 ft. No. 6 Wire, with snap ..... ₱ doz 4.00
No. 40, 3½ ft. No. 6 Wire, with toggle ..... ₱ doz 4.30
No. 45, 3½ ft. No. 6 Wire, with snap ..... ₱ doz 4.50
No. 50, 4 ft. No. 4 Wire, with toggle ..... ₱ doz 4.75
No. 55, 4 ft. No. 4 Wire, with snap ..... ₱ doz 5.00
No. 60, 4½ ft. No. 3 Wire, with toggle ..... ₱ doz 5.50
No. 65, 4½ ft. No. 3 Wire, with snap ..... ₱ doz 5.80
Crow Bars.—Cast Steel ..... ₱ ℔ 6¢

Cutlery.—Pocket American Shear Co.'s ..... dis 40 %
Butcher Knives, Wood's, Lap Bolster, Square Handle ..... dis 40 %
Steak Knives ..... dis 40 %
Lap Bolster, Oval Handle ..... dis 40 %
Sticking ..... dis 40 %
Skinning ..... dis 40 %
Butcher, Common Round Handle, Wood's ..... dis 40 %
Shoe Knives, Wood's ..... dis 30 %
Dividers.—Cook's ..... dis 25 %
Dog Collars. ..... dis 20 %
Door Springs.—Torrey Rod ..... ₱ doz $1.62
Imitation Torrey's Rod ..... ₱ doz 1.45
Gem Coil, new list ..... dis 50&10¢
Crown ..... ₱ doz $1.2
Warner's ..... ₱ doz 1.75
Door Stops.—Thurston's ..... dis 50 %
Drawer Knobs.—Thurston's ..... dis 50 %
Drills.—Morse Bitt Stock } dis 40&10%
Morse Straight Shank }
Emery.—Wellington Mills ..... ₱ ℔ 10¢
Walpole Emery Mills ..... ₱ ℔ 5¢
Turkish, in 10 ℔ cans ..... ₱ ℔ 7¢
Enameled Ware.—
Standard Mfg. Co. Kettles ..... dis 60 %
Standard Sauce Pans ..... dis 30 %
Felloe Plates.—Wrought ..... ₱ ℔ ¢
Files.—American File Co. ..... dis 60 %
Nicholson File Co. ..... dis 60 %
Fluting Machines.—Knox List, $4.00 ..... dis 25 %
Forks.—W. C. & Co. ..... dis 60 %
Eastern Tool Co.'s. Manure ..... dis 60 %
Gimlet Bits.—
Genuine German, No. 125, 1-32 to 8-32 ..... ₱ doz $1.00
Pierce's ..... ₱ doz .88
Glass Cutters.—Combination Glass Cutter and Knife Sharpener ..... ₱ doz $1.00
Grub Hoes.—K. P. & Co.'s No. 2, $11.50 ₱ doz. dis 50 & 10 %
Hammers.—Maydole's ..... dis 15 %
Hartford Hammer Co ..... dis 20 %
Hangers & Rollers.—Anti-Friction ..... dis 50 %
Acme Rollers ..... dis 50 %
Climax ..... dis 50 %
Common Hangers ..... dis 50&10 %
Common Rollers ..... dis 50&10 %
Victor Hangers ..... dis 50 %
Victor Rail ..... dis 50 %
Hand Screws. ..... dis 10 %
Hatchets.—C. F. Dowse, new list ..... dis 35 %
Underhill ..... dis 35 %
Hay Knives.—Lightning ..... ₱ doz $18.00, net
Hinges.—Strap and T (new list) ..... dis 65&10 %
Providence Plate ..... ₱ ℔ 5 ¢
Wrought Screw Hook ..... ₱ ℔ 5 ¢
Hoes.—Eastern Tool Co. ..... dis 60&10 %
W. C. & Co.'s ..... dis 60 %
Hooks and Staples.—Brewers (new list) ... dis 70 %
Horse Nails.

	No. 6	7	8	9	
Putnam Pointed	.24	.22	.21	.20	5&7 %
Bridgewater	.23	.21	.20	19	30 %

Ice Cream Freezers.—Packer's, new list. dis 50&10%
Knobs.—"Norwalk." New list ..... dis 66⅔ %
Silver Glass ..... dis 50&10 %
Silver Glass Bell Pulls ..... dis 50&10 %
Lanterns.—Tubulars, No. 0 ..... ₱ doz $7.50
Lawn Mowers.
Continental ..... dis 40&10 %
Quaker City ..... dis 40&10 %
National ..... dis 50 %
Lead.—Sheet ..... ₱ ℔ 7 ¢
Pipe ..... ₱ ℔ 6¼ ¢
Locks.—Norwalk ..... dis 66⅔ %
Eagle Cabinet ..... dis 40 %
Eagle Trunk ..... dis 15 %
Mallory, Wheeler & Co. ..... dis 66⅔ %
Manure Forks.—W. C. & Co. ..... dis 60 %
Eastern Tool Co.'s ..... dis 60 %
Mattocks.
K. P. & Co., Long Cutter, $16.00 ₱ doz. ..dis 50 & 10 %
K. P. & Co., Short Cutter, $15.50 ₱ doz. .dis 50 & 10 %
K. P. & Co., Pick Cutter, $16.00 ₱ doz ...dis 50 & 10 %
Measuring Tapes.—Eddy's ..... dis 20 %
Meat Cutters.—Miles' Challenge ..... dis 30 %
Hale's (new list) ..... dis 40&10 %
American ..... dis 33⅓ %
Money Drawers.—Tucker's Alarm .... ₱ doz $22.50
Mouse Traps.—Delusion ..... ₱ doz 1.25
Novelty ..... ₱ doz
Nails. ..... ₱ keg $2.65
Oilers.—Zinc and Tin ..... dis 60 %
Brass and Copper ..... dis 50 %
Ox Bows.—Extra finished and varnished .... dis 15 %
1⅛ in., ₱ dos. pair...$7.00 | 2 in., ₱ dos. pair..$10.00
1¼ in., ₱ dos. pair... 9.00 | 2¼ in., ₱ dos. pair.. 12.00
Paper.—Common Tarred Sheathing ..... ₱ ℔ 1½¢
Eagle Brand Tarred Sheathing ..... ₱ ℔ 2 ¢
Common, Dry Sheathing ..... ₱ ℔ 1¾¢
Eagle Brand Dry Sheathing ..... ₱ ℔ 2¾¢
Picks.—K. P. & Co., Adze Eye, 5 to 6 ℔ $12.00, dis 50 & 10 %
K. P. & Co., Adze Eye, 6 to 7 ℔ $13.00 ..... dis 50 & 10 %
Planes.
Auburn Tool Co., Bench ..... dis 20 %
Auburn Tool Co., Fancy ..... dis 15 %
Auburn Tool Co., English Iron ..... dis 15 %
N. Y. Tool Co., Bench ..... dis 25 %
Plated Ware.—Rogers & Bro. ..... dis 50 %
Pliers.—Vom Cleff & Co. s ..... net list
Button's Wire Pliers ..... dis 33⅓ %
Plumb & Levels.—Stanley R. & L. Co.. dis 70&10 %
Potato Diggers.—W. C. & Co., reduced list. Eastern Tool Co.'s ..... dis 60 %
Pulleys.—Acme or Excelsior, 1¾ in. ..... ₱ doz 22¢
Acme or Excelsior, 2 in ..... ₱ doz 24¢
Pumps.—Union Manufacturing Co.
Iron Cistern ..... dis 50 %
Iron Pitcher Spout ..... dis 60 %
Copper ..... dis 30 %
Rivets.—In 5 ℔ papers ..... dis 45 %
Burrs ..... dis 50 %
Copper ..... dis 50 %
Razors.—Torrey's ..... dis 20 %
Rules.—Stanley, Boxwood ..... dis 75&10 %
Stanley, Ivory ..... dis 50&10 %
Sad Irons.—Common ..... ₱ ℔ 3¢
Laundry ..... ₱ ℔ 6¼¢
Tailors' Geese ..... ₱ ℔ 6 ¢
Enterprise "Potts" ..... dis 35 %
Sash Locks.—King & Hutchinson's, new list. dis 40 %
Sandpaper.—Baeder & Adamson ..... dis 40 %
Sash Weights.—Patent Eye ..... ₱ ℔ 1¼¢
Saws.—Hand Saws, Disston's ..... dis 20 %
Cross-Cut Saws.
Disston's, Common Tooth ..... ₱ foot 68¢, dis 45 %
Disston's Great American Tooth .. ₱ foot 68¢, dis 45 %
Boynton's Lightning Tooth ..... ₱ foot 45¢
M. B. & D., Hand Saws ..... dis 33⅓ %
Richardson Bros ..... dis 25 %
Saw Blades.—Disston ..... dis 20 %
Welch & Griffith, Extra ..... ₱ doz $7.20
Welch & Griffith, No. 2 ..... ₱ doz 6.00
Scales.—Fairbanks ..... dis 20 %
Screws.
Flat-Head Iron ..... new list, dis 85 %
Flat-Head Brass ..... new list, dis 85 %
Round-Head Brass ..... new list, dis 85¼ %
Round-Head Iron ..... new list, dis 83⅓ %
Grilley Round-Head Nickel-Plated Common.. dis 60 %
Scythes.—Clippers, in boxes ..... ₱ doz $6.00
Shaves.—Kimball's ..... ₱ inch 7½¢
Watrous ..... dis 20 %
Shears.—American Shear Co., new list ..... dis 70 %
Shot.—Le Roy ..... ₱ ℔ 6¢
Shovels.—O. Ames, new list ..... dis 20 %
O. Ames, other brands, new list ..... dis 20 %
Sinks.—Magee Patent ..... dis 30 %
Snow Shovels. $3.75
Skates.—Union ..... dis 40 %
Union Roller ..... dis 25 %
Stocks and Dies.—King's ..... dis 10&5 %
Tacks.
Swedes Tinned ..... dis 55&10 %
Swedes Iron ..... dis 55&10 %
Gimp and Lace ..... dis 60&10 %
Copper Tacks ..... dis 50&10 %
Traps.—Oneida, Genuine ..... dis 33⅓ %
Oneida, Imitation, H. & N. ..... dis 60 %
Blake's ..... dis 40&10 %
Vises.—Simpson's Adjustable ..... dis 25&5 %
Howard Vise Co. ..... dis 25 %
Prentiss' ..... dis 20 %
Weather Strips.—Packer's ..... ₱ doz $3.50
Browne's Flexible Rubber ..... dis 30 %
In 25 feet boxes: No. 1, ⅛ in. wide, ₱ yard, 10¢; No. 2, ¾ in., 15¢.; No. 3, ⅞ in., 20¢.: No. 4, 1 in., 25¢
Black Walnut Spring Weather Strips ..... ₱ doz $3 50
Window Springs. ..... dis 35 %
Babcock's No. 3 ..... ₱ gross $6.25
Babcock's No. 4 ..... ₱ gross 4.15
Wire Cloth.—"Clinton" ..... ₱ sq. ft 2 ¢
Wire Fence.
Washburn Painted Barbed ..... ₱ ℔ 4½¢
Washburn Galvanized Barbed ..... ₱ ℔ 5 ¢
Wire Goods.—Gate Hooks & Eyes ..... 70&10&5
Wrenches.—A. G. Coe's ..... dis 60 %
Girard Mfg. Co ..... dis 60&10 %
Girard Agl ..... dis 70&10 %
"Always Ready" ..... dis 25 %
Wringers.
Novelty for Common Tubs No. 2—10-Inch. ₱ dos $27.00
" " " " No. 3—11-Inch. ₱ dos 31.50
Excelsior for Stationary Tubs No. E—10-Inch ..... ₱ dos 39.00
Excelsior for Stationary Tubs No. F 11-inch ..... ₱ dos 43.50
Excelsior with Folding Bench No. A—10-Inch ..... ₱ dos 48.00
Excelsior with Folding Bench No. B—11-Inch ..... ₱ dos 52.50
Novelty Set Tub, E ..... ₱ dos .....
Keystone, Wood Frame No. 1½ ..... ₱ dos .....
Keystone, Iron Frame No. 2½ ..... ₱ dos .....
Zinc ..... ₱ ℔

McNab & Harlin Mfg. Co.,

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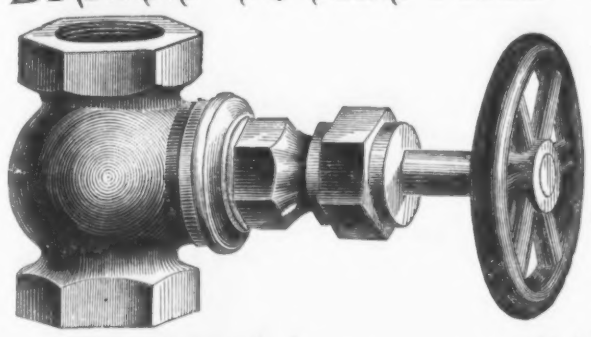

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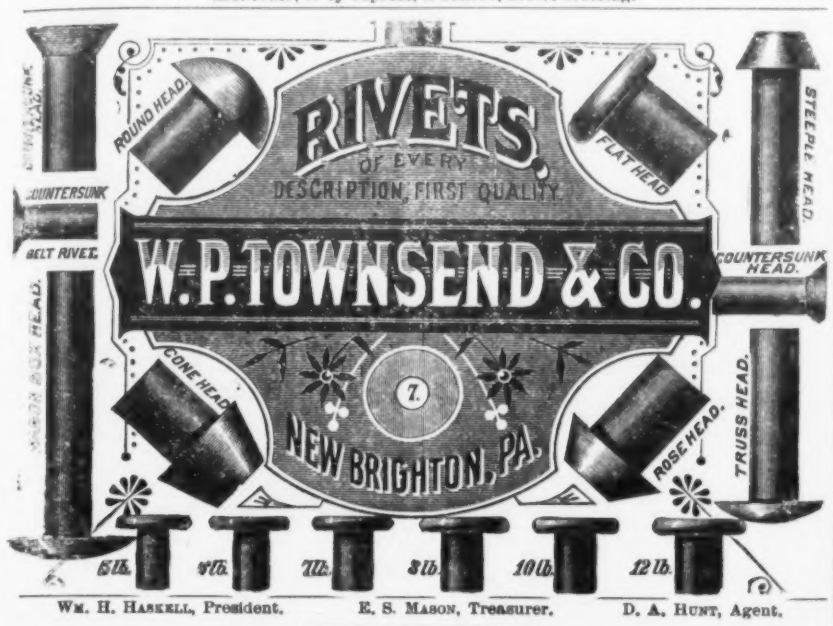

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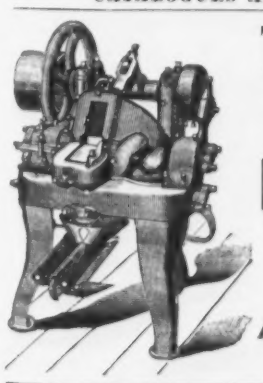

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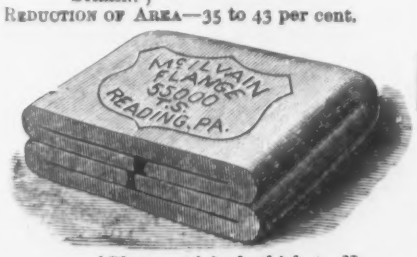

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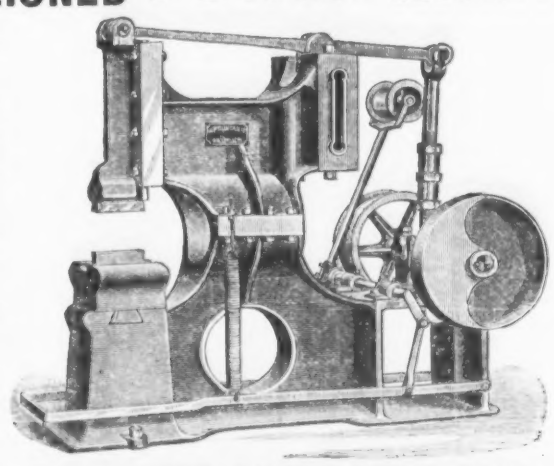

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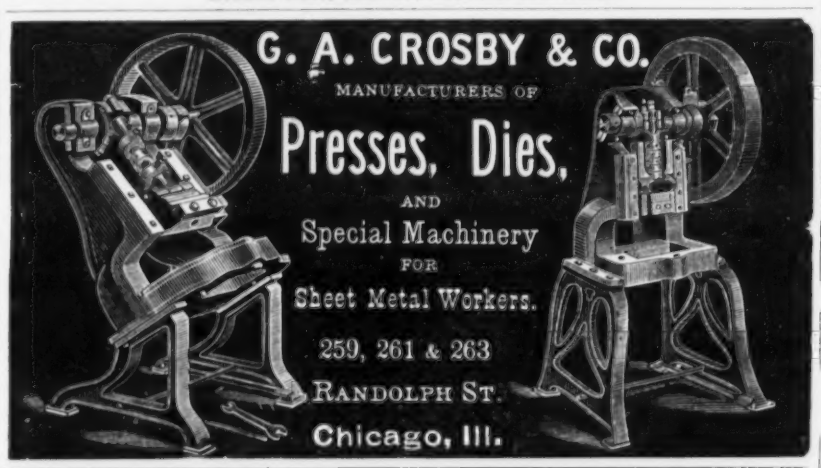

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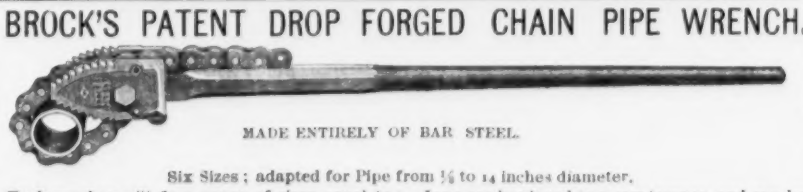

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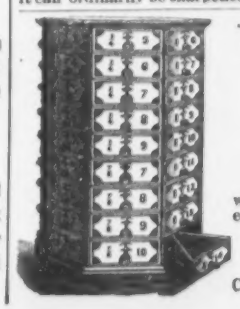

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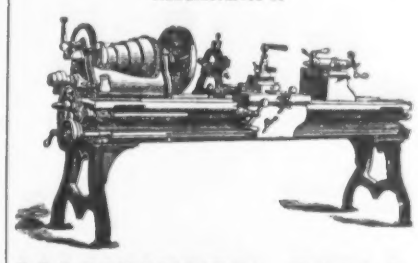

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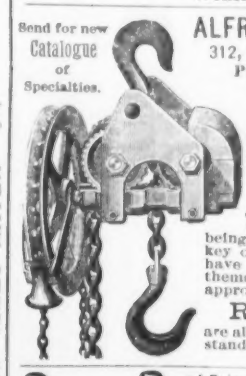

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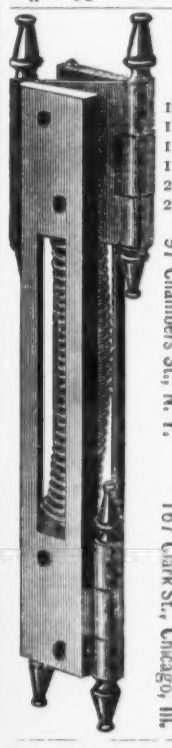

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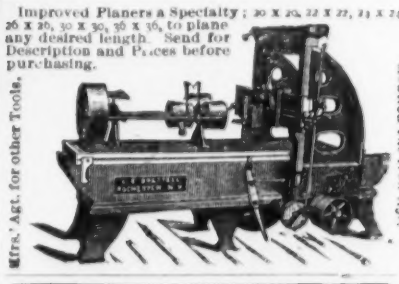

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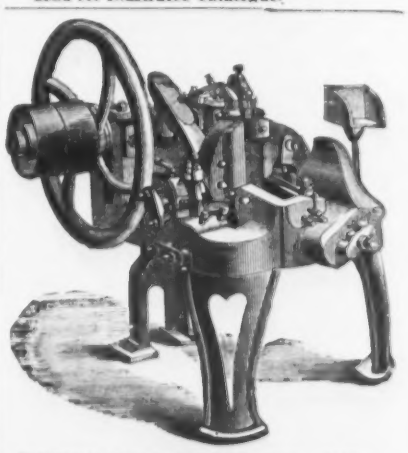

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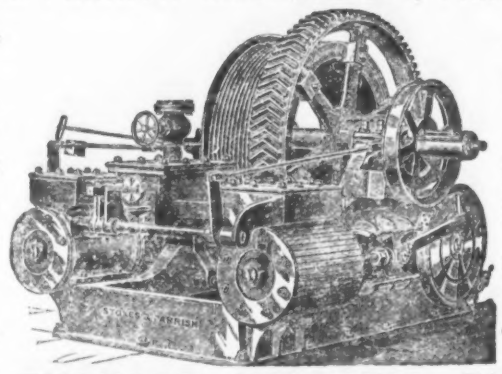

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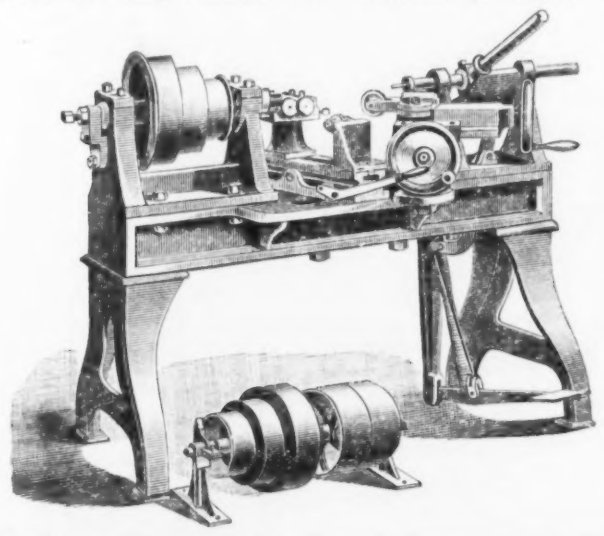

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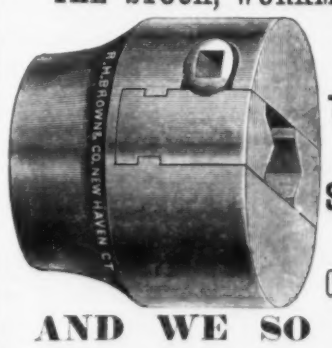

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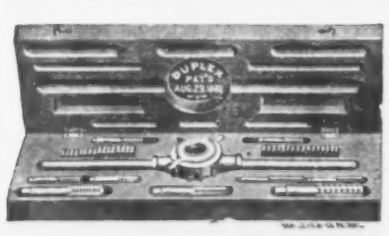

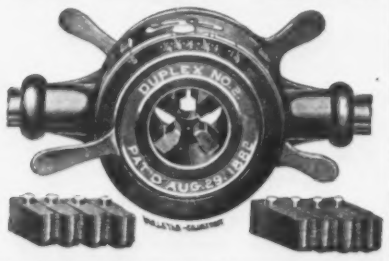

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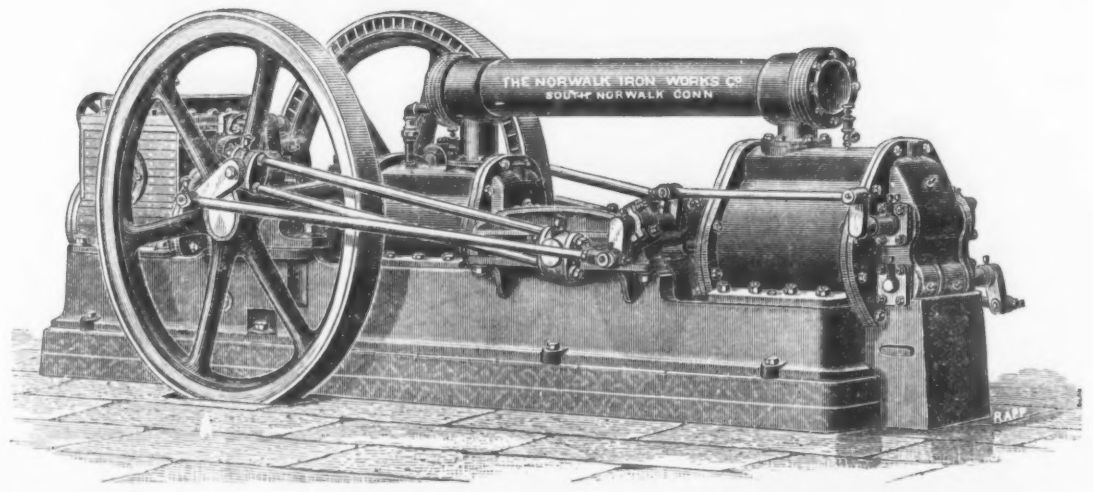

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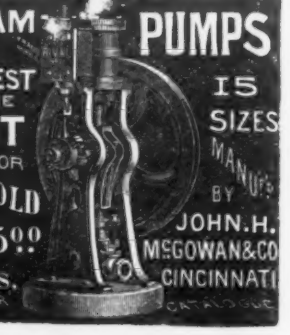

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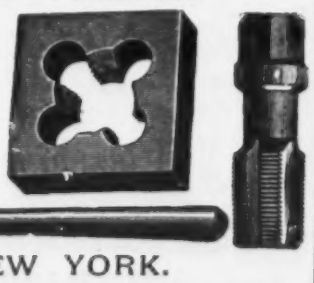

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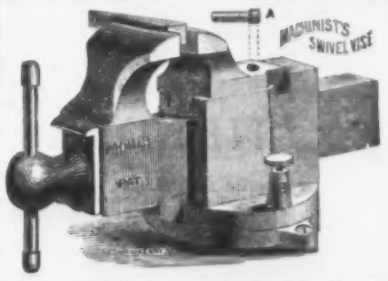

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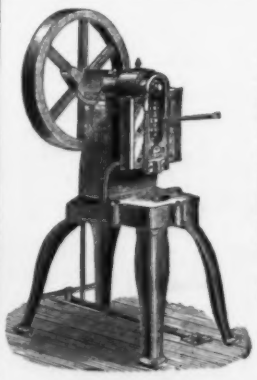

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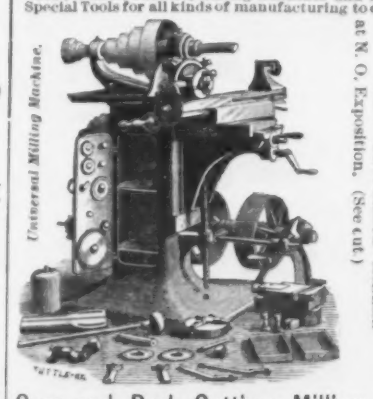

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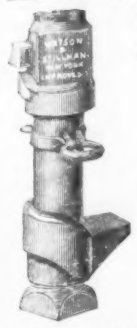

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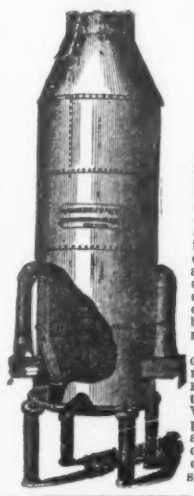

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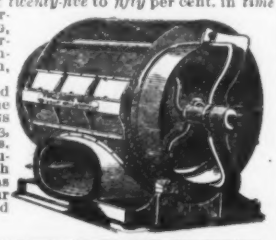

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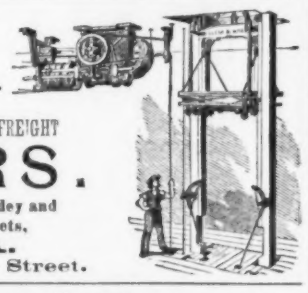

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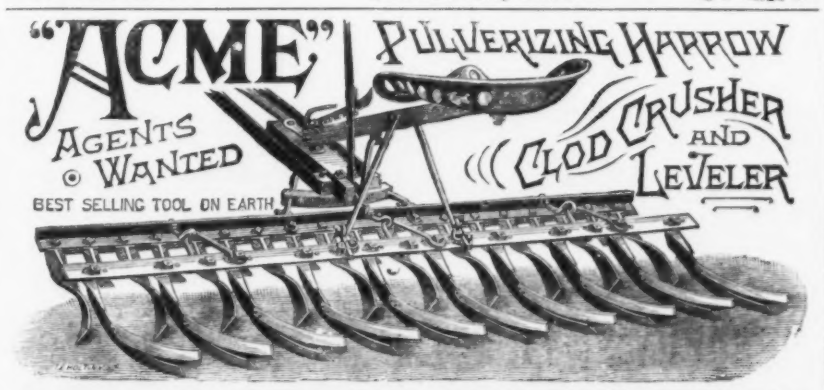

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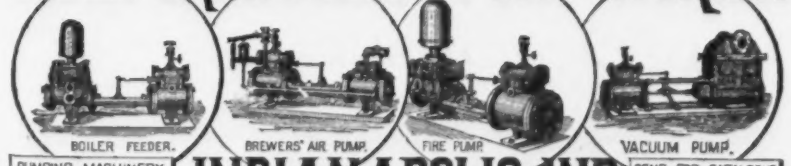

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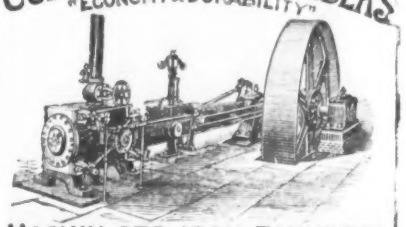

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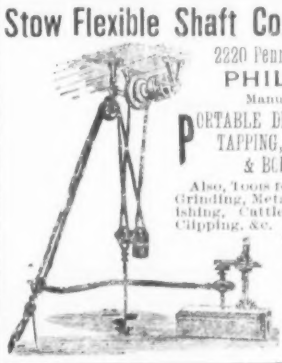

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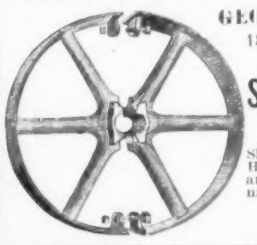

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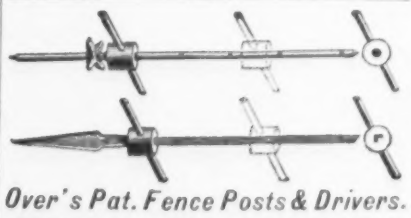

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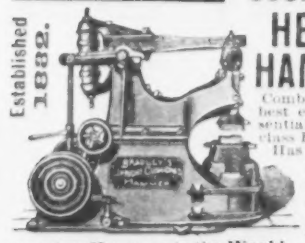

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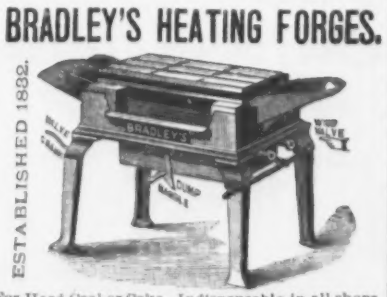

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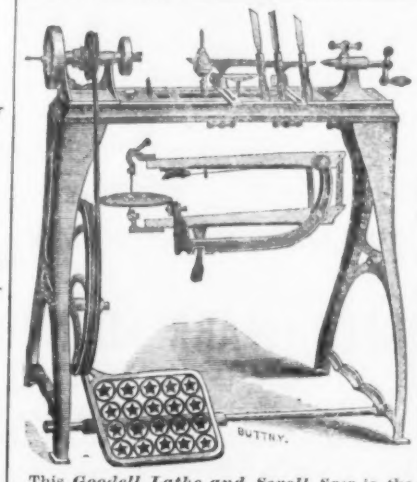

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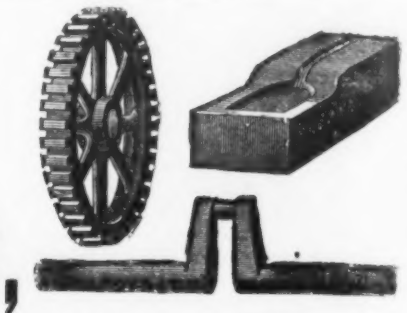

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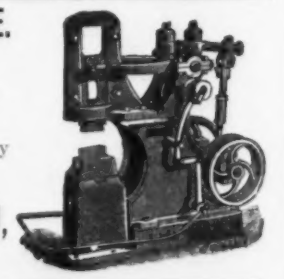

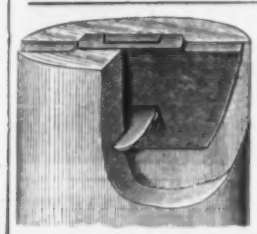

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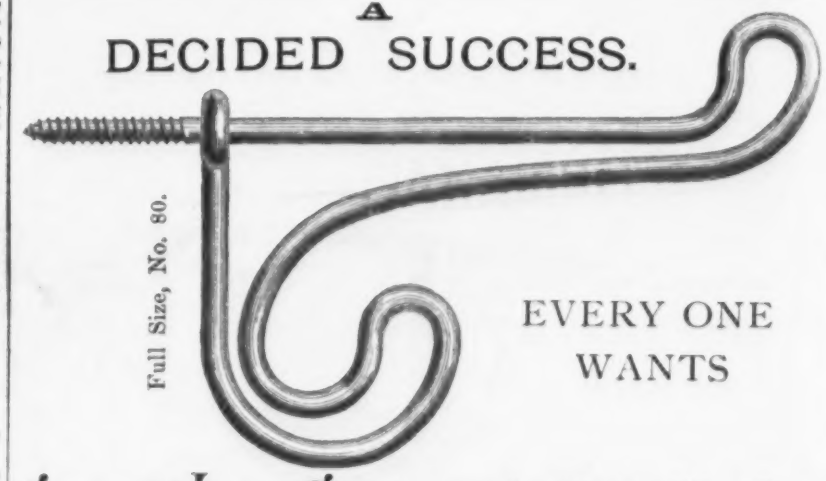

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